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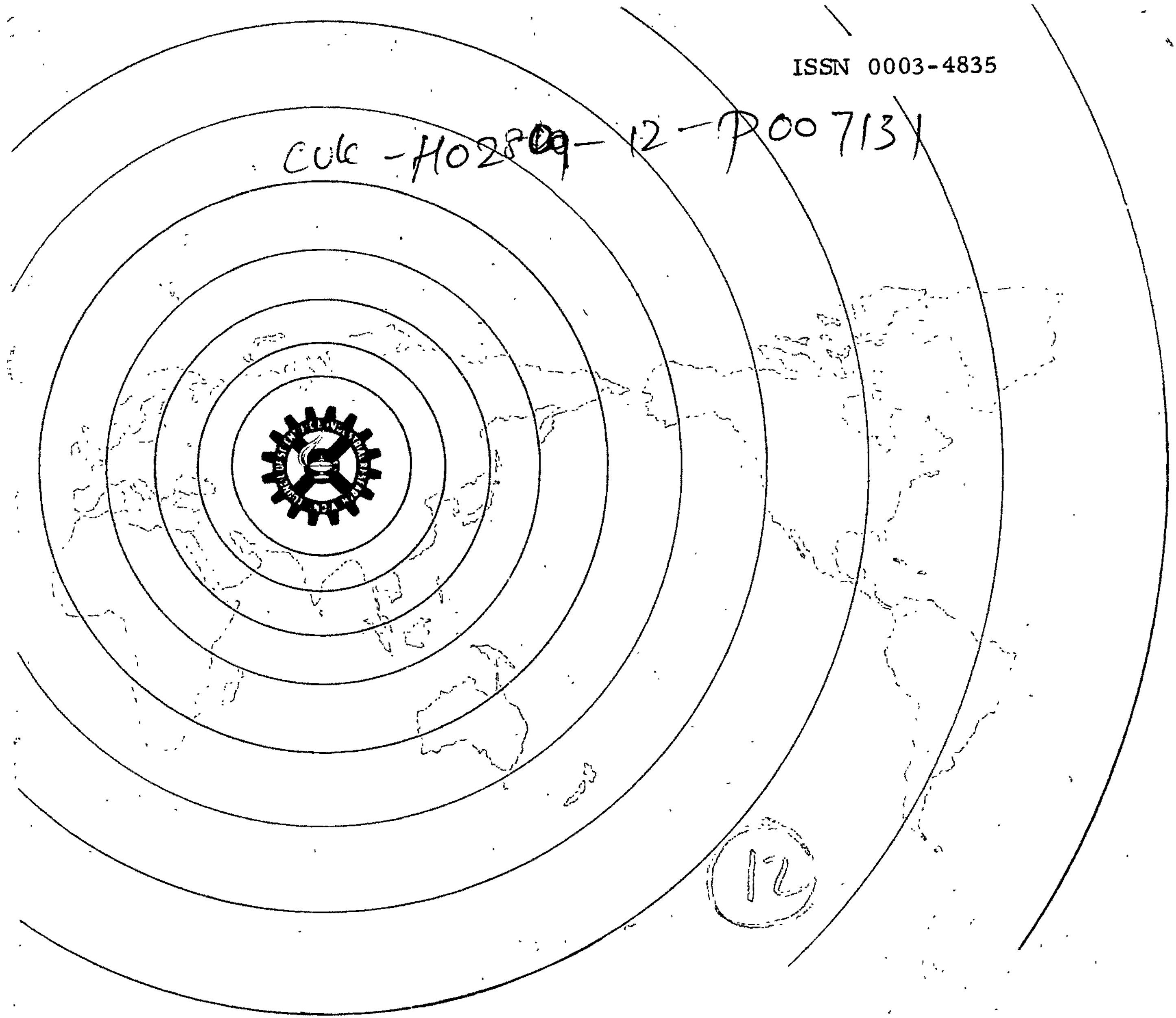

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CONTENTS

Pages

GUPTA (P K)
Library and Information Science Curriculum Development 3-21

SEN (B K)
Growth of Indian Scientific Periodicals 22-30

DHIRENDRA RAO (M K)
PERT/CPM - its Application to Library and Information Systems 31-37

SAHA (Karuna)
Use Pattern of Indian Institute of Technology, Delhi Library 38-47

SENGUPTA (I N)
Bioresearch Planning and Information Needs for Biomedical Scientists in India 48-51

CHAKRABORTY (A R) and CHAKRABORTY (B)
Giants in Library and Information Science 52-54

MOHINDER SINGH
Studies of Chemical Literature and Changes in the Ranking of Periodicals by Citation Analysis of Data for 1967-76 55-61

YADAV (R S) and KARANJAI (Aruna)
Meeting the Information Needs of Research Scientists – A Sample Analysis of INSDOC Document Supply Services 62-67

TANEJA (S K)
Aerospace Information System in India – A Proposed Plan 68-71

SETTY UMAPATHY (K)
Iranian Documentation Centre (IRANDOC) 72-74

GUPTA (D K)
Selection of Secondary Information Services 75-78

DEVADASON (F J) and BALASUBRAMANIAN (V)
ASTS: Automated System for Generating Thesaurus from Subject Representations 79-85

GUPTA (D K)
Plate Tectonics: A Study of Transmission of Ideas 86-92

SADHU (Ashok)
Designing a Computerised Catalogue Using COBOL 93-97

RAGHAVAN (K S)

Journal Acquisition and Cost-effectiveness in a Special Library — A Case Study 98-100

GUPTA (R C), JAYARAMAN (N), KRISHAN LAL and RAVINDRAN (C C)

Maintenance of Periodical Collection: A Statistical Case Study 101-105

NARAYANA (G J), DESAI (H G) and JOSEPH (L)

Fungal Attack on Books: A Report 106-109

SURENDAR MOHAN

Agricultural Information Network in India 110-116

SATISH (N G)

Reporting of the Indian Social Science Periodical Literature in International Abstracting Services 117-121

MALHAN (I V) and THAKAR (G S)

District Libraries in Himachal Pradesh: A Survey 122-131

FOCUS ON UNISIST PROGRAMMES 132-135

BOOK REVIEWS 136-141

INDEX

LIBRARY AND INFORMATION SCIENCE CURRICULUM DEVELOPMENT: A SURVEY

P.K. GUPTA
Dept. of Library Science & Documentation
University of Rajasthan, Jaipur-4

Reports the results of a sample survey conducted to find out the nature of jobs performed by library personnel with training in Librarianship and relates them to the contents of existing courses and also to find out areas in librarianship where more emphasis is needed to equip the students of librarianship in a better way to perform the jobs.

0 INTRODUCTION

Historically, libraries have been a part of the community, both academic and public, in India since long but library science education as an organised effort can be traced only from the beginning of the twentieth century. Studies in the history of library education in India reveal that there were six universities in India with a provision for Diploma Course in library science, before independence in 1947. Since then library science education has kept pace with the developments in other sectors of human life. At present there are 42 universities which run courses at postgraduate level in the country [1]. Out of these, ten have a provision for master level programmes. Out of these, 9 universities also have a provision for Ph.D. as well [2]. In addition, specialised courses with a slant towards documentation, reprography and information science are available at the Documentation Research and Training Centre (DRTC), Bangalore, and the Indian National Scientific Documentation Centre (INSDOC), New Delhi.

India, as it is apparent by now, has vast and varied resources for library and information science (L & IS) education. A look into literature on L & IS education in India reveals beyond doubt that there have not been critical or evaluative attempts to study the L & IS training programmes so far as their effectiveness and adequacy to library workers is concerned. Further, a study of L & IS curricula of various schools reveal little change in the present decade. A notable exception may be the Department of Library Science at University of Delhi.

During last two decades, libraries have changed a great deal due to increase in the amount of information generated and with the increase in the use of information available. Increased pressure on libraries of all types is a function of such a change experienced in the last two decades. Pressure from the public and awareness of the role of information today, demand a variety of library services to suit their specific requirements. Such factors necessitate a deeper look into the role of library schools as well as the structure of the course contents.

1 SURVEY AIMS

This article presents the results of a survey, of working-librarians, which has as its aims:

1. To study the types of job activities performed by library personnel with post-graduate training in librarianship;

2. To reveal subject-areas which require priority consideration in L & IS courses:

    (a) as revealed by the job activities performed by the librarians, and

    (b) as revealed by their interest to undertake courses in different subject-areas;

3. To reveal areas in librarianship in which librarians feel that L & IS training could not equip them;

4. To explore the responsibilities of library-schools;

5. To know the interest of working librarians for advanced courses in librarianship, and in other subjects.

2 SAMPLE & QUESTIONNAIRE

For this survey a sample of 200 graduates and postgraduates from four library-schools of North India (namely, Aligarh Muslim University, University of Delhi, Punjab University, Chandigarh, and University of Rajasthan, Jaipur), who passed out during 1970-75, was selected. A questionnaire entitled 'Need Based Library Training: A Study for Curriculum Development' was sent to the persons in the sample to collect data from those who were working in libraries. The questionnaire was based on a similar study by Kortendick and Stone conducted with federal librarians in USA in 1968 [3].

In addition to the covering letter, the questionnaire had four parts (see Appendix), asking the graduates to respond on the following:

Part I: Evaluating the job activities you perform in relation to time and importance.
II: Your educational needs.
III: Some information about yourself and your career.
IV: Your ideas and comments.

Part I was designed to study three factors:

1. What job activities are performed by the librarians?;
2. How time consuming each activity is in their job? ; and
3. How important each activity is in their job? .

Part II was designed to study the following four aspects of their educational needs:

1. What type of training respondents would like to undertake? ;
2. What areas in librarianship were of interest to the working librarians for further training? ;
3. Other subject areas in which they will be interested in studying; and
4. In what ways library schools could help them in their professional development?

Part III was meant to collect background characteristics of the librarians. Other information gathered with this part was about scientific, technical or professional courses they lacked which could help them perform their jobs better, extent of utilisation of their talents, etc.

Part IV collected response of the librarians towards this survey, including their suggestions for courses and curricula.

3 RESPONSE TO THE QUESTIONNAIRE

A reminder was issued, after four weeks of sending the questionnaire, to all who did not respond. After three weeks of sending the reminders a total of 80 (i.e. 40.00%) replies were received. The breakdown of response in various categories was as follows:

Completed questionnaire - 45 (i.e. 22.5% of sample)

Incomplete questionnaires - 6 (i.e. 3.0% of sample)

Rest of the respondents did not fill up the questionnaire for the following reasons:

Unemployed - 15 (i.e. 18.75% of the respondents)
On study leave - 3 (i.e. 3.75% of the respondents)
Left the profession - 3 (i.e. 3.75% of the respondents)
Joined teaching faculty - 8 (i.e. 10.00% of the respondents)

4 SURVEY RESULTS

Results of the survey have been grouped under four sections i.e. Background information about librarians, Analysis of job activities, Course demand, and Additional data for course building and adaptation.

41 Background Information about Librarians

This section brings out information about personal and job related variables, i.e. sex ratio, age distribution, professional experience, type of job activity, number of people employed in library, utilisation of talents, and educational variables of the librarians.

411 Sex Ratio

In this survey 11.9 per cent of the respondents have reported to be head of the library, 21.43 supervisors (supervising a number of professional and/or technical personnel). Among the respondents highest concentration was in the category of reference followed by cataloguing and classification as their chief activity.

415 Number of People Employed

Average number of employees in a library was 33.9. But it should be noted that this does not reflect the average number of employees in a library, since the unit of sample was a librarian. As a consequence large libraries had more librarians in the sample.

Number of Employees in a library	Response Percentage
1	8.88
2	8.88
3	6.66
4 to 20	33.33
21 to 50	30.95
51 and more	9.53

416 Utilisation of Talents

Out of all, 37.76 per cent of response was 'very well' or 'to full capacity' utilisation of talents while 55.54 was 'fairly well' or 'very little'. Only 6.70 per cent reported that their talents were not utilised at all. Generally speaking the administrators have reported better utilisation of talents.

Type of position	Response Percentage			
	To full capacity	Very well	Fairly well	Very little
Administrator	15.55	11.11	31.10	6.66
Non-administrator	2.22	8.88	11.11	6.66
Total	17.77	19.99	42.21	13.33

In analysing replies to some other questions in this survey it appears that librarians are not satisfied with the utilisation of their talents. However, the table above shows that most of the people are fairly well satisfied. Thus this aspect admits of further study.

417 Educational Variables

Educational variables of the respondents have been summerised in the following statements:

All respondents possessed at least a Bachelor's degree in other subjects; and more administrators were Bachelor in arts (42.22 per cent of respondents).

Librarians with Master's in library science were 35.54 per cent. More administrators were Master's in library science (68.75 per cent of the response).

In addition 77.75 per cent of the respondents were with Master's degree in other subjects. Subject qualification did not show any correlation with the type of position. Overall 73.52 per cent of this category were with Master's degree in humanities or social sciences.

None of the respondents possessed Ph.D. in any subject area. Respondents with foreign language qualification (other than English) amounted to be 22.22 per cent. German and Russian were the popular choice among them.

421 Analysis of Job Activities: Quantitative

Respondents varied widely in the degree to which they found questionnaire applicable to their positions. Taking all the respondents together the mean number of items checked for 'specialised library functions' was 7.35 and with a range of 0 to 22; the mean number of 'general administration and management functions' checked by all was 2.44 and with a range of 0 to 7. Taking all the job items together, the mean number checked was 9.53 and with a range of 0 to 29 (See Appendix Table 2)

Administrators, in 'specialised library functions', as well as 'general administration and management functions' checked more items than non-administrators. This might be an indication that the administrators are spending a considerable time operating at a non-administrative level. This finding is in conformity with the results of Kortendick and Stone [3].

4211 Dimension of Time

Appendix, Table 3 indicates the highest response rates on the time factor for all respondents. Accompanying graph shows the percentages of response in the category consuming more than 25 per cent time and consuming 10 to 25 per cent time for five top ranking job activities. (See also Appendex, Table 4).

After assigning weights to three possible degrees of applicability rated scores for all items were computed. Appendix, Table 5 presents the top ranking 15 job items. In comparing Table 4 and 5, it is noted that only 12 items are common. Items like 'controlling' and 'coordinating' do not appear in Table 5 at all because most of the respondents checked these items in less than 10 per cent time consuming activities.

4212 Dimension of Importance

It was found that the number checking the importance factor for each item was the same as the number checking the time factor. Job activities, were then ranked according to weighted importance score for all respondents, and top ranking 15 job items are presented in Appendix, Table 6. On comparing Table 4 and 6, it is noted that 13 items are common. Items like 'supervise binding of documents' do not occur in Table 6.

One marked difference in Table 5 and 6 is that Table 6 includes more of 'administration and management functions.' They are five in Table 6 as compared to two in Table 5. 'Controlling', 'coordinating' and 'housing' are the three new items in weighted importance ranking. This indicates a preference towards 'administration and management functions' in the importance dimension over 'specialised library functions'.

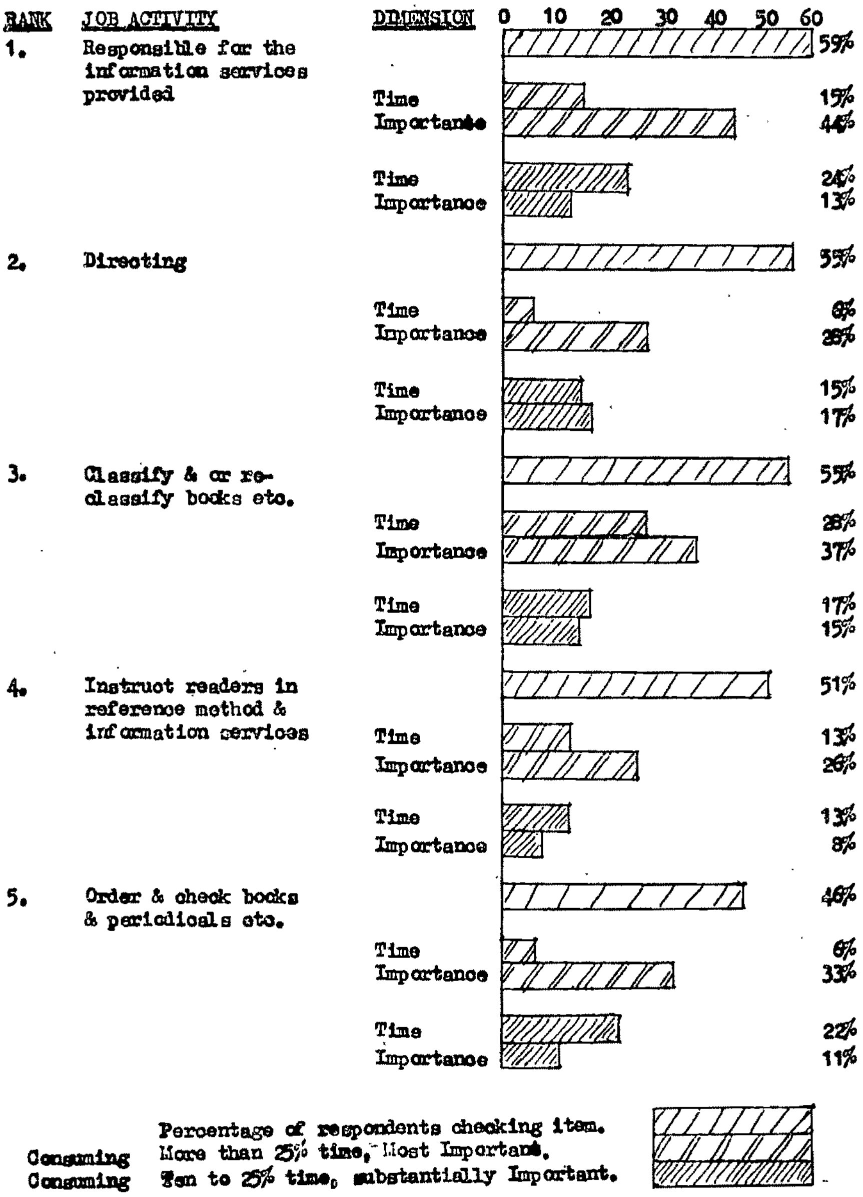
4213 Joint Time and Importance

Weighted time and importance score for each activity was added to get a joint time and importance scale. To get a picture in terms of major job functions, this score for all job items in a major job function, was added. The resulting 15 major job functions ranked according to this score are presented in Appendix, Table 7, which suggests that 'cataloguing' and 'classification' in 'specialised library functions'; and 'directing', and 'planning' in 'administration and management functions' will need priority consideration in our courses. The results obtained from this analysis conform to those of Kortendick and Stone.

422 Analysis of Job Activities: Qualitative

Respondents were asked to indicate activities that they felt they performed with greatest competence, and that they performed with least competence.

JOB ACTIVITIES SHOWING HIGHEST %AGE OF RESPONSE



The question about greatest competence was answered by 84.44 per cent of the respondents, while, as expected, the question about least competence was answered by 31.11 per cent only.

The subject areas ranking high in greatest competence were:

Classification	26.23% response
Reference	26.23% response
Cataloguing	18.03% response
Documentation	11.48% response

The subject areas ranking high in least competence were:

Cataloguing	35.29% response
Classification	17.64% response
Acquisition	11.76% response

Main reasons cited by the respondents for competencies, both greatest and least, were:

Experience of working on the job;
Interest or linking of the subject;
Training in the subject; and
Training in service.

In addition to these were a few reasons, like flair, importance of the subject, training in the subjects other than library science, etc.

423 Conclusions from Analysis of Job-activities

As administrators checked more job items and their range of checking items was also larger (Appendix, Table 2) it indicates that there is a greater variation in job items performed by administrators. Further, this indicates that the administrators are spending a considerable time operating at a non-administrative level. This might be due to a shortage of staff, small size of the library, etc.

The number of respondents checking the importance factor for each item was generally the same as the number checking the time factor. There was a higher tendency towards 'administration and general management functions' in the importance dimension than time. 'Directing' held a higher position in importance - dimension which demands a priority consideration for management skills in the library science curriculum.

When time and importance scores were used together to rank major job functions, 'cataloguing and classification' ranked first in the 'specialised library functions', and received 188, score higher than the second 'selection and acquisition'; 'directing' ranked first in the 'administration and general management functions', and received 46 score higher than t the second 'Planning'.

In response to the question asked about their greatest competence, 'classification' and 'reference' got first two ranks. It was surprising to note that 'general administration and management function' could not find a place among the top few. This further necessitates more emphasis on managerial skills in library science training. Response to areas of least competencies included 'cataloguing', and 'classification' as the first two.

43 Course Demands

Data obtained from part II was used to obtain information about the course needs and interests of the librarians. Respondents were asked to give options as to whether they would prefer workshop/seminars (i.e. from few days to four weeks programmes), or regular courses/intensive short term courses, if they wish to undertake courses in library science.

Only 22.22 per cent of the respondents were not inclined to undertake any courses. Out of the rest 40 per cent did not indicate their preference for either of the two; 28.57 per cent preferred workshops/seminars; and 31.43% preferred regular courses/intensive short term courses as their option. Out of the respondent to this question, 84.29 per cent were administrators, indicating a greater interest for updating their knowledge among administrators.

First five areas of such study cited by the respondents in the order of priority were:

Management technique;
Current awareness services;
Classification and cataloguing;
Documentation services; and
Information storage and retrieval.

Other subject areas of interest were, indexing and abstracting, reprography, computer application in libraries, current trends in librarianship, reference services, etc.

Analysis of this part also indicates to lay more emphasis on managerial skills in library science courses and to provide special courses in this area for administrators.

In response to an open end question in the part IV, many suggestions to improve existing courses were available. Following statements record these suggestions :

Practical training should be given greater emphasis in Bachelor and Master courses.

During the training programme, two or more hours daily for training in the library should be made compulsory.

Course duration should be increased from one academic year to one calender year or two academic years.

Syllabii in Bachelor course should be reduced or its duration should be increased.

Syllabii should have more relevance with practice in libraries.

Subject areas other than cataloguing and classification should be emphasised.

There should be papers on technical writing, personnel management, and computer programming.

There was also a suggestion to reduce the number of seats in library science schools.

44 Additional Data for Course Building and Adaptation

Some questions were asked to collect information such as, interest in joining advanced courses in library science, interest in other courses, courses which can help them to perform their job better, job activities for which they have not received training, and the ways in which library schools could help in their professional development.

441 Advanced courses in librarianship

In response to the question 'would you entroll in any advanced course in librarianship'?, 73.32 per cent of the respondents indicated their willingness for enrollment to advanced courses. Out of these only 30.3 per cent were non-administrators. Thus indicating a higher tendency among administrators for advanced training. Correlating with the variable i.e. respondents who possess master level qualification in library science, it points out a clear demand for post - master's level programmes in library science. It becomes more evident by the fact that 81.25 per cent of the respondents to this question, who checked 'Yes', already possess master's level qualification in library science.

442 Interest in other courses

Response to the question 'Would you enroll for a course in some other subject area?' indicated that 39.99 per cent of the respondents were willing to undertake courses in subject areas other than librarianship. This might be taken to indicate that subject specialisation plays an important role in library service.

Subjects which received high priority were sciences, biological sciences, foreign languages (other than English), and computer technology. Some other subjects were personnel management, reading habits among users, journalism, etc.

Other courses which might be helpful in their position, as indicated by 28.88 per cent of all respondents, included courses in computer technology, management, foreign languages, mathematics, instruments and their use, etc.

Data in this section is also suggestive of a high demand for courses in management, computer technology, foreign languages, etc.

443 Gaps in the Training

When asked, 'In relation to your present position, are there any activities for which your training has not prepared you?', 33.33 per cent of response was affirmative. Various functions which got high score were, abstracting and indexing, binding routines, handling of correspondence, and ordering and filing. Other functions included work about audio-visual aids /non-printing material, technical writing, weeding, public relation activity, acquisition management, how to improve reading habits of users, etc.

444 Library Schools and the Professional Development of its Graduates.

In reply to the question 'In what other ways, in addition to workshops, seminars, and courses, do you feel that the library schools could help you in your professional development?, only 4.44 per cent of the respondents felt satisfied with the role played by library schools, while 48.88 per cent of the respondents gave concrete suggestions to improve the role of library schools in professional development of its graduates. Some of them which are suggestive of a wider responsibility and role of the library schools, than what they are, are given below:

To publish newsletter or information bulletins with latest development in library and information science, day to day problems of libraries and their practicable solutions, etc., for the former graduates.

To prepare and send pertinent bibliographies on various aspects of library and information science to its former students.

To keep the former students aware of latest trends in librarianship, libraries, and the profession at large.

To hold lectures and discussions on practical aspects of librarianship, library administration, and to solve problems of librarians. Such lectures or discussions should be organised fortnightly or monthly.

To visit libraries in the area (with students) to study their problems and to suggest solutions to improve libraries.

To develop some model libraries in the area where the former students can be given practical training.

To organise reorientation programmes in the form of summer schools.

To start master's level library science programme through correspondence for working librarians.

To start post master's level research programmes, etc.

These suggest a wider role of library schools, and envisage library schools not only as an education centre but also as a clearing house for information on librarianship, and as a discussion centre.

45 Conclusion & Suggestions

The present study has been able to reflect upon some problems existing in the profession at large and educational needs in librarianship. Educational needs point out the gaps in library training at present.

451 Professional Problems

Existing problems in the profession need a penetrating look by the library educators in order to tailor their courses and curricula at various levels of library science education.

There is an urgent need to resolve the professional boundaries. We must decide now the extent to which traditional discipline should change to include new knowledge like computer applications, information science, modern techniques of organisation, etc.?

When the discipline includes a larger area of activities to be performed, an unavoidable result is fission into smallergroups specialising in a part of the knowledge. Knowledge in the library profession has reached such a stage. So we must decide now as to what extent library schools should encourage specialisation? We must also be conscious about the effects such specialisation could have on the professional unity or disintegration.

A problem requiring priority consideration is the need and ways of continuing education in the library profession. With the constant increase in the knowledge in library science and need for continuing education for practioners is also increasing and alongwith increases the responsibility of the library schools to cope with this problem.

One important aspect revealed in this study i is the need to provide training/in managerial skills. We must decide now as to what extent library schools should equip its graduates with managerial skills?

This survey further points out the need to raise the level and standard of library science education on the whole. With increase in standard of library education, the need to provide continuing education to working professionals also increases.

452 Educational Needs

A considerable affirmative response was obtained from librarians in joining various courses in librarianship. More than 85 per cent of the respondents indicated willingness to join courses in the form of workshops, seminars, regular course, and intensive short term courses. More than 70 per cent of the respondents indicated their willingness to join post master's level courses in library science. About 40 per cent of the respondents stated that they would be willing to join courses in subjects, like sciences, biological sciences, foreign languages, computer technology, etc. This study also points out that courses in management, computer technology, foreign languages, instruments and their use, etc., would be helpful to librarians to perform their job better.

Need for continuing education also received weightage from the response that 28.88 per cent of the respondents listed courses which would be helpful in their position, and 33.33 per cent of the respondents indicated job activities in their position for which library science training did not prepare them.

Management techniques was the sole area which was cited by more than 40 per cent of the respondents in which they would like to have courses Current awareness services, cataloguing and classification, documentation services, and information storage and retrieval were other important areas of course demand.

A wide gap between library training and library work exists which has been emphasised by a large number of respondents. In their suggestions about courses and curriculum again they have emphasised to correlate theory and practice of librarianship. This creates a demand for closer contacts and relations among library administrator and library science teachers, though the trend appears to be reverse.

Regular courses as a choice was not rated as an option by larger number of respondents as compared with workshops, seminars, or regular and short term courses. There was a demand expressed for summer schools to be organised by the library schools. Some respondents also expressed their wish to have correspondence courses at the Master level in library science.

Chief subject areas required in post master's level library science courses, as revealed in this study are administration and management, and specialisation in library subjects.

Administration and management requires top priority consideration as revealed in various sections of this study. Section on course demand ranks it at the first priority as more than 40 per cent of the respondents wish to have courses in this area.

With this survey, it has been tried to bring ~~in~~ into focus the needs of working librarians and their implications on L & IS curricula and L & IS schools. The seminars on L & IS education held at the Department of Library Science, University of Delhi in 1977 ~~has also~~ recognised 'the need to review and redesign the present syllabi of Library Science/ Library and Information Science at the Bachelor's and Master's level to meet the changing requirements of Libraries/Information Centre/Documentation Centres and towards this end recommends the.. 'conduct of a survey of the utilisation of graduates of Library Science Schools... 'In addition socio-economic factors, technological changes and future needs should also be taken into consideration while developing or adapting L & IS courses & curricula.'

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APPENDIX TABLE I

Type of Position	Total Number	Sex Ratio % of Response		Average Age	Average Years of Professional Experience
Administrative	26	Male	66.7	30.70	6.73
		Female	33.3		
Non-administrative	15	Male	66.7	29.06	5.26
		Female	33.3		
No response	4	Mean		30.12	6.19

TABLE 2

APPLICABILITY OF JOB INVENTORY: FREQUENCY OF JOB ITEMS CHECKED BY RESPONDENTS BY TYPE OF POSITIONS

No. of job items checked	FREQUENCY OF RESPONDENTS								
	Specialised lib. functions			Adm. Functions			All Functions Together		
	Administrative	Non-Administrative	Total	Administrative	Non-Administrative	Total	Administrative	Non-Administrative	Total
0	1	0	1	7	9	16	0	0	0
1	2	2	4	6	1	7	2	2	4
2	0	1	1	2	1	3	0	0	0
3	3	2	5	3	1	4	0	1	1
4	3	0	3	2	2	4	2	0	2
5	4	1	5	2	1	3	4	3	7
6	2	0	2	2	0	2	2	0	2
7	1	5	6	6	0	6	2	3	5
8	1	0	1				2	1	3
9	0	2	5				2	0	2
10 (& above)	3	2	5				1	1	2
	(12)	(4)	(16)				(14)	(5)	(19)
11	1	1	2				3	0	3
12	2	0	2				0	2	2
13	1	0	1				1	0	1
14	2	1	3				0	1	1
15	0	0	0				1	0	1
16	0	0	0				1	0	1
17	1	0	1				0	0	0
18	0	0	0				1	1	2
19	0	0	0				1	0	1
20 (& above)	2 (29)	0 (16)	2				5	0	5
Mean	8.03	6.12	7.35	3.03	1.26	2.44	10.46	7.66	9.53
Range	1-22	0-14	0-22	0-7	0-5	0-7	0-29	0-18	0-29

TABLE 3

RELATIVE SCORE OF VARIOUS JOB ACTIVITIES

I SPECIALISED LIBRARY FUNCTIONS

Job Activities	Time Score (1)	Weighted Time Score (2)	Weighted Importance Score (3)
In Indexing & Abstracting, I:			
1. Scan literature	9	27	39
2. Prepare abstracts	6	22	28
3. Others:	4	14	16
In Selection & Acquisition, I:			
4. Am overall responsible for selection of material	13	35	45
5. Order & check books and periodicals etc.	21	53	91
6. Procure books and periodicals etc.	18	56	72
7. Maintain financial and other records	18	50	70
8. Others:	2	4	4
In Cataloguing & Classification, I:			
9. Classify and/or reclassify books etc.	25	93	107
10. Catalogue books etc.	21	75	89
11. Maintain & develop the lists of subject-headings.	12	40	34
12. Maintain catalogues & other records	19	55	69
13. Classify and/or catalogue public-documents and technical reports.	11	33	39
14. Others	5	13	21
In Circulation/Lending, I:			
15. Circulate holdings on request	18	56	66
16. Circulate inter-library-loan materials	9	17	21
17. Route periodicals on request	10	48	30
18. Others:	1	5	5

Table 3 (Contd.)

		(1)	(2)	(3)
In Maintenance of Holdings, I:				
19.	Am responsible for preservation of stock	16	20	40
20.	Supervise binding of documents	12	20	40
21.	Weed out-of-date material	8	10	22
22.	Others:	0	0	0
In Reference, I:				
23.	Am responsible for the reference information services provided	27	77	119
24.	Am responsible and/or compile bibliographies, reading lists, etc.	11	29	41
25.	Instruct readers in reference methods and information sources	23	59	79
26.	Plan and/or conduct orientation programmes for readers	6	12	16
27.	Others:	2	6	6
Other Activities, I:				
28.	Am responsible and/or do translation work	2	6	6
29.	Am responsible and/or do editing work	3	11	11
30.	Am responsible for printing various lists, stationery, etc.	3	3	9
31.	Others:	2	6	10
32.	Others:	2	4	6
33, 34 & 35.		0	0	0
II. ADMINISTRATION AND MANAGEMENT FUNCTIONS				
36.	PLANNING i.e. dealing with goals & objectives, costing of library activities, budget policies, implementation of policies etc.	16	40	58
37.	ORGANISING i.e. dealing with grouping of various activities; allocation of staff, line and staff relations, maintenance of organisation charts & staff manuals, etc.	11	25	37
38.	STAFFING i.e. dealing with personnel policies & procedures, forecast staffing-needs, selection of personnel, training programmes, performance appraisals, etc.	7	9	21

Table 3 (Contd.)

		(1)	(2)	(3)
39.	DIRECTING i.e. dealing with supervision of subordinates, job-assignments, checking work of subordinates, decision-making, administering discipline, communication etc.	25	51	93
40.	COORDINATING i.e. dealing with Coordination of activities of various groups, informal contacts, holding group meetings, anticipation of problems etc.	13	25	47
41.	CONTROLLING i.e. dealing with library standards, scheduling and phasing activities, measurement of performance, progres-reports, etc.	15	27	55
42.	REPRESENTING i.e. dealing with issue of news releases, writing articles, work with contractors and consultants, participation in meetings, conferences etc.	10	20	28
43.	HOUSING i.e. dealing with planning of library buildings, use of library space, physical maintenance of library equipment housing etc.	16	30	50

TABLE 4

JOB ACTIVITY ITEMS SHOWING HIGHEST RESPONSE RATES ON TIME FACTOR FOR ALL RESPONDENTS

S.No.	Job Items	Rank	% age Response
1.	Am responsible for the reference information services provided	1	59.94
2.	DIRECTING i.e. dealing with supervision of subordinates, job-assignments, checking work of subordinates, decision-making, administering discipline, communication etc.	2	55.50
3.	Classify and/or reclassify books, etc.	2	55.50
4.	Instruct readers in reference methods and information sources	3	51.06
5.	Order and check books and periodicals, etc.	4	46.64
6.	Maintain catalogues and other records	5	42.18
7.	Maintain financial and other records	6	39.97
8.	Procure books and periodicals, etc.	6	39.97
9.	Circulate holdings on request	6	39.97
10.	Am responsible for preservation of stock	7	35.52

Table 4 (contd)

11.	CONTROLLING i.e. dealing with library standards, scheduling and phasing activities, measurement of performance, progress reports, etc.	8	31.10
12.	Am overall responsible for selection of material	9	28.86
13.	COORDINATING i.e. dealing with coordination of activities of various groups, informal contacts, holding group meetings, anticipation of problems, etc.	9	28.86
14.	Maintain and develop the lists of subject-headings	10	26.64
15.	Supervise binding of documents	10.	26.64

TABLE 5

JOB ACTIVITY ITEMS RANKED ACCORDING TO WEIGHTED TIME SCORE

S.No.	Activity	Score	Rank
1.	Classify and/or reclasify books, etc.	93	1
2.	Am responsible for the reference information services provided	77	2
3.	Catalogue books,etc.	75	3
4.	Instruct readers in reference methods and information sources	59	4
5.	Procure books and periodicals, etc.	56	5
6.	Circulate holdings on request	56	5
7.	Maintain catalogues and other records	55	6
8.	Order and check books and periodicals, etc.	53	7
9.	DIRECTING i.e. dealing with supervision of subordinates, job-assignments, checking work of subordinates, decision-making, administering discipline, communication, etc.	51	8
10.	Maintain financial and other records	50	9
11.	Maintain and develop the lists of subject-headings	40	10
12.	Am responsible for preservation of stock	40	10
13.	PLANNING i.e. dealing with goals and objectives, costing of library activities, budgets policies, implementation of policies, etc.	40	10
14.	Am overall responsible for selection of material	35	11
15.	Classify and/or catalogue public documents and technical reports.	33	12

TABLE 6

JOB ACTIVITY ITEMS RANKED ACCORDING TO WEIGHTED IMPORTANCE

S. No.	Activity	Score	Rank
1.	Am responsible for the reference, information services provided	93	1
2.	Classify and/or reclasify books, etc.	77	2
3.	DIRECTING i. e. dealing with supervision of subordinates, job-assignments, checking work of subordinates, decision making, administering discipline, communication, etc.	75	3
4.	Order and check books and periodicals, etc.	59	4
5.	Catalogue books, etc.	56	6
6.	Instruct readers in reference methods and information sources	55	6
7.	Procure books and periodicals, etc.	53	7
8.	Maintain financial and other records	51	8
9.	Maintain catalogues and other records	50	9
10.	Circulate holdings on request	40	10
11.	Am responsible for preservation of stock	35	11
12.	PLANNING i. e. dealing with goals and objectives, costing of library activities, budgets policies, implementation of policies, etc.	33	12
13.	CONTROLLING i. e. dealing with library standards, scheduling and phasing activities, measurement of performance, progress-reports, etc.	30	13
14.	HOUSING i. e. dealing with planning of library buildings, use of library space, physical maintenance of library, equipment housing, etc.	29	14
15.	COORDINATING i. e. dealing with Coordination of activities of various groups, informal contacts, holding group meetings, anticipation of problems, etc.	28	15

TABLE 7

MAJOR JOB FUNCTIONS RANKED ACCORDING TO WEIGHTED JOINT TIME & IMPORTANCE SCORE

1. SPECIAL LIBRARY FUNCTION

		SCORE
1.	Cataloguing & Classification	668
2.	Selection & Acquisition	480
3.	Reference	444
4.	Circulation/Lending	228
5.	Maintenance of Holdings	196
6.	Indexing & Abstracting	146
7.	Other Activities	62

2. GENERAL ADMINISTRATION AND MANAGEMENT FUNCTION

		SCORE
1.	Directing	144
2.	Planning	98
3.	Controlling	82
4.	Housing	80
5.	Coordinating	72
6.	Organising	62
7.	Representing	48
8.	Staffing	30

QUESTIONNAIRE

NEED BASED LIBRARY TRAINING: A STUDY FOR CURRICULUM DEVELOPMENT

PART I - EVALUATING JOB ACTIVITIES YOU PERFORM IN RELATION TO TIME AND IMPORTANCE

DIRECTIONS FOR COMPLETION OF PART I OF THE QUESTIONNAIRE:

On the following pages you will find a number of statements about job activities which might apply to your position. May I request you to rate each in terms of how time consuming and important it is as compared to other activities.

First, decide whether the statement applies to your position. Base this decision on actually what you do. If the statement is not applicable to your position, leave the columns under Time & Importance blank.

If the statement is applicable to your position, indicate in TIME column how time-consuming this activity is as COMPARED TO OTHER ACTIVITIES in your entire job.

● One that consumes 25% or more of your time
◐ Consumes 10% to 25% of your time
○ Consumes less than 10% of your time.

Then assess how important the activity is as COMPARED TO OTHER ACTIVITIES (in terms of its contribution to effective performance of your job). Indicate it by checking (✓) the relevant symbol in the IMPORTANCE column. The symbols & their meanings are:

● One of the most important parts of the position.
◐ A substantial part of the position.
○ One of the least important parts of the position.

PLEASE NOTE:

In Part I, please check (✓) only those positions activities which you directly and actually perform yourself.

If the statement describes something that is:

1. delegated by you to a subordinate; or,
2. is strictly the concern of a superior, it is

not a part of your position. Please leave the boxes that pertain to it, blank.

A. **SPECIALISED LIBRARY FUNCTIONS**

In this section, you need to reply only those parts of the questionnaire that apply to your job. Then skip to Section B.

TIME			IMPORTANCE			JOB ACTIVITIES
●	◐	○	●	◐	○	In Indexing & Abstracting, I:
( )	( )	( )	( )	( )	( )	1. Scan literature.
( )	( )	( )	( )	( )	( )	2. Prepare abstracts.
( )	( )	( )	( )	( )	( )	3. Others:____________.
						In Selection & Acquisition, I:
( )	( )	( )	( )	( )	( )	4. Am overall responsible for selection of material.
( )	( )	( )	( )	( )	( )	5. Order & check books and periodicals etc.
( )	( )	( )	( )	( )	( )	6. Procure books and periodicals etc.
( )	( )	( )	( )	( )	( )	7. Maintain financial & other records.
( )	( )	( )	( )	( )	( )	8. Others:____________.
						In Cataloguing & Classification, I:
( )	( )	( )	( )	( )	( )	9. Classify and/or reclassify books etc.
( )	( )	( )	( )	( )	( )	10. Catalogue books etc.
( )	( )	( )	( )	( )	( )	11. Maintain & develop the lists of subject-headings.
( )	( )	( )	( )	( )	( )	12. Maintain catalogues & other records.
( )	( )	( )	( )	( )	( )	13. Classify and/or catalogue public-documents and technical reports.
( )	( )	( )	( )	( )	( )	14. Others:____________.
						In Circulation/Lending, I:
( )	( )	( )	( )	( )	( )	15. Circulate holdings on request.
( )	( )	( )	( )	( )	( )	16. Circulate inter-library-loan materials.
( )	( )	( )	( )	( )	( )	17. Route periodicals on request.
						18. Others:____________.
						In Maintenance of Holdings, I:
( )	( )	( )	( )	( )	( )	19. Am responsible for preservation of stock.
( )	( )	( )	( )	( )	( )	20. Supervise binding of documents.
( )	( )	( )	( )	( )	( )	21. Weed out-of-date material.
( )	( )	( )	( )	( )	( )	22. Others:____________.

TIME			IMPORTANCE			JOB ACTIVITIES
●	◐	○	●	◐	○	In Reference, I:
( )	( )	( )	( )	( )	( )	23. Am responsible for the reference information services provided.
( )	( )	( )	( )	( )	( )	24. Am responsible and/or compile bibliographies, reading lists, etc.
( )	( )	( )	( )	( )	( )	25. Instruct readers in reference methods and information sources.
( )	( )	( )	( )	( )	( )	26. Plan and/or conduct orientation programmes for readers.
( )	( )	( )	( )	( )	( )	27. Others:______________________.
						Other activities; I:
( )	( )	( )	( )	( )	( )	28. Am responsible and/or do translation work.
( )	( )	( )	( )	( )	( )	29. Am responsible and/or do editing work
( )	( )	( )	( )	( )	( )	30. Am responsible for printing various lists, stationery, etc.
( )	( )	( )	( )	( )	( )	31. Others:______________________.
( )	( )	( )	( )	( )	( )	32.
( )	( )	( )	( )	( )	( )	33.
( )	( )	( )	( )	( )	( )	34.
( )	( )	( )	( )	( )	( )	35.

B. GENERAL ADMINISTRATION AND MANAGEMENT

Here are various functions you perform in your job as related to your area of responsibility, whether it be for a whole library, a branch, department or division, or the specialised library function assigned to you.

TIME			IMPORTANCE			JOB ACTIVITIES
●	◐	○	●	◐	○	
( )	( )	( )	( )	( )	( )	36. PLANNING i.e. dealing with goals & objectives, costing of library activities, budgets policies, implementation of policies etc.
( )	( )	( )	( )	( )	( )	37. ORGANISING i.e. dealing with grouping of various activities; allocation of staff, line and staff relations, maintenance of organisation charts & staff manuals, etc.
( )	( )	( )	( )	( )	( )	38. STAFFING i.e. dealing with personnel policies & procedures, forecast staffing-needs, selection of personnel training programmes, performance appraisals, etc.
( )	( )	( )	( )	( )	( )	39. DIRECTING i.e dealing with supervision of subordinates, job-assignments, checking work of subordinates, decision-making, administering discipline, communication etc.

TIME			IMPORTANCE			JOB ACTIVITIES
●	◐	○	●	◐	○	
( )	( )	( )	( )	( )	( )	40. COORDINATING i.e. dealing with Coordin tion of activities of various grou informal contacts, holding group meetings, anticipation of problems et
( )	( )	( )	( )	( )	( )	41. CONTROLLING i.e. dealing with library standards, scheduling and phasing activities, measurement of performance, progress-reports, etc.
( )	( )	( )	( )	( )	( )	42. REPRESENTING i.e. dealing with issue of news releases, writing articles, work with contractors and consultants, participation in meetings, conferences, etc.
( )	( )	( )	( )	( )	( )	43. HOUSING i.e. dealing with planning of library buildings, use of library space, physical maintenance of library equipment housing etc.

PART - II:- YOUR EDUCATIONAL NEEDS

1. To upgrade and update your present knowledge, would you feel interested in undertaking some training in different areas of librarianship? 1. ( ) Yes; 2. ( ) No.

If Yes. Would you like to undertake:
Workshops/Seminars (i.e. few days to four weeks programme)
or, Regular courses/intensive short-term courses.

Please indicate area/areas of your interest in studying: (e.g. Personnel administration, current awareness services etc.)

1. ______________________________

2. ______________________________

3. ______________________________

4. ______________________________

5. ______________________________

2. Would you enroll for a course in some other subject-area? 1. ( ) Yes; 2. ( ) No.

If Yes, what area or discipline? ______________________________

3. In what other ways, in addition to workshops, seminars and courses, do you feel that the library-schools could help you in your professional development?

____

____

____

PART III - SOME INFORMATION ABOUT YOURSELF AND YOUR CAREER

A. YOUR PRESENT JOB:

1. What is the title of your present position? ______________

2. Do you have any administrative/Supervisory responsibilities.

1. ( ) Yes; 2. ( ) No.

If yes, please indicate so by checking one box in section A, B or C.

A. ADMINISTRATIVE:

1. ( ) Head of Library; 2. ( ) Assistant or Associate Head:
3. ( ) Head of Dept. Or Division 4. ( ) Head of Branch and;
5. ( ) Others: ______________

OR B. 6. ( ) SUPERVISORY i.e. responsibility for supervising a number of professional and/or technical positions, but not overall programme responsibility.

OR C. 7. ( ) ONE TO THREE PERSON LIBRARY - general responsibilities.

3. In which of the following types of library-activities are you primarily engaged?

8. Cataloguing & Classification 9. Circulation
10. Indexing & Abstracting. 11. Non-print materials.
12. Periodicals. 13. Personnel.
14. Public relations. 15. Reference/Bibliography/Reader's Services.
16. Selection & Acquisition. 17. Systems analysis.
18. Translation. 19. Others: ______________

4. Approximately what is the total no of people (including professional and non-professional) employed in your library at this location where you work: ______________

5. How well does your job utilise your talents?

1. ( ) To full capacity; 2. ( ) Very well
3. ( ) Fairly Well 4. ( ) Very little
5. ( ) Not at all.

B. YOUR EDUCATION:

To give a picture of your educational background, please complete the table below:

TYPE OF STUDY PROGRAMME	TITLE OF DEGREE	YEAR PROGRAMME COMPLETED	AREA OF SPECIALISATION
6. ( ) Bachelor's in Lib. Sc.			
7. ( ) Master's in Lib. Sc.			
8. ( ) Certificate Course in Lib. Sc.			
9. ( ) Bachelor's in other subject.			
10. ( ) Master's in other subject.			
11. ( ) Doctorate in other subject.			
12. ( ) Other courses.			

13. Would you enroll in any advanced course in librarianship?

1. ( ) Yes; 2. ( ) No.

14. Are there any formal scientific, technical or professional courses you lack which would have been specially helpful in your position?

1. ( ) Yes; 2. ( ) No.

If Yes, please specify courses or course areas. (e.g. Statistics; Operation research, etc.).

____

____

____

15. In relation to your present position, are there any activities for which your training has not prepared you? 1. ( ) Yes; 2. ( ) No.

If Yes, please specify these activities: (e.g. Indexing techniques; Binding routines etc.).

____

____

____

____

____

C. YOUR EXPERIENCE

1. How many years of professional experience do you have?
Years________Months__________.

2. Do you have any experience in an occupation other than librarianship?

1. ( ) Yes; 2. ( ) No.

If Yes, which occupation or profession you served most?

____

3. Which of the activities do you feel you perform with the greatest competence?

____

____

Please indicate why you feel you have achieved this competence:

1. because______________________________

____

2. because______________________________

____

4. Which of the activities do you feel you perform with the least competence?

____

____

Please indicate why you feel you have achieved little competence in these areas:

1. because______________________________

____

2. because______________________________

____

5. What is your age? (______) Years.

PART - IV : YOUR IDEAS AND COMMENTS

1. YOUR COMMENTS ON JOB ACTIVITIES: (e.g. Part I of this questionnaire).

2. YOUR SUGGESTIONS FOR COURSES AND CURRICULA:

3. YOUR SUGGESTIONS ABOUT THIS STUDY:

This is the end. Thank you for your help.

(Pavan K. Gupta).

Note: Extract of this survey was presented as a paper entitled 'Need based library training a study for curriculum development in the Seminar on Library & Information Science Education in India, Oct 3-8,1977,Delhi.

P, 7131

GROWTH OF INDIAN SCIENTIFIC PERIODICALS 1788-1965: AN OUTLINE OF A COMPREHENSIVE BIBLIOGRAPHY

B.K. SEN
Insdoc, New Delhi-12

The author has been working on the compilation of a complete bibliography of Indian scientific periodicals. It has been planned to bring out a monograph containing the bibliographical history of about 6000 periodicals. The present contribution is a brief account of the scope, arrangement, indexes, and methodology of compilation of this projected publication.

INTRODUCTION

With the founding of the Asiatick Society in Calcutta by Sir William Jones in 1784, the seed of modern scientific research got implanted in the ever fertile soil of India. The scope of investigation of the Asiatick Society, as described by its founder was "... the geographical limits of Asia, and within the limits its enquiries will be extended to whatever is performed by man or produced by nature... ". Undeniably the scope of the Society was extremely broad. Future showed that the members of the Society took its objective to their heart and worked sincerely to produce huge amount of literature of incalculable value not only for India but also for the world as a whole.

As a sequel to the establishment of the Asiatick Society, there appeared the first Indian research periodical the "Asiatick Researches or Transactions of the Society instituted in Bengal for inquiring into the History and Antiquities, - the Arts, Sciences and Literature of Asia", to publish original scientific contributions. This periodical is considered by many as the first Indian scientific periodical. Ever since, the growth of Indian scientific periodicals has been more or less steady and is now growing at the rate of about 50 periodicals per year.

At present scientific periodicals in India are coming out in all important areas of science in almost all possible forms and shapes with variegated periodicities and uneven qualities containing from most erudite research papers down to most simple popular articles, and serving both scientists and non-scientists including literate farmers.

GENESIS - The panorama of Indian scientific periodicals enchanted the present author at the very beginning of his career. Fourteen years ago, when the author alongwith his other senior and junior colleagues, was surveying the coverage of Indian scientific literature in some major international abstracting and indexing services, the idea of surveying the coverage of Indian scientific periodicals in the 'World List of Scientific Periodicals', 3rd ed., 1963-65 once flashed across his mind. For doing so there was need to compile a comprehensive bibliography of Indian scientific periodicals, since no such bibliography was compiled before.

The work of compilation began. In the initial stages for about 6 months or so, the author was assisted by one of his colleagues (Shri J.C. Gera) and thereafter it was a completely lone journey. The 14-year old odyssey is on the verge of completion. The shore, for which the navigator sailed so long is within sight. The journey has made it possible for the author to glean data of about 6000 scientific periodicals. It has been planned to bring out a book encompassing the entire data. The following is a brief account of the scope, methodology of compilation, arrangement, indexes and limitations of the proposed book.

SCOPE - The word 'scientific periodical' has been taken in the same sense in the book as in the World List of Scientific Periodicals, and as such apart from regular scientific periodicals, proceedings, transactions, bulletins, annuals, yearbooks, directories appearing at regular or irregular intervals, abstracting periodicals, indexing periodicals, documentation lists, reviews, and all other publications of serial nature pertaining to pure and applied sciences have been covered. Various reports of organisations and institutions, ministries/departments, etc. of central and state governments devoted to various branches of science, technology, and related disciplines have also been included. Category-wise learned/research, technical, popular, trade, and data periodicals plus house organs on science and technology have been encompassed.

The period that has been covered is evident from the title, i. e. 1788 to 1965. Attempts have been made to cover all the periodicals, both ceased and continuing that appeared during this span of time. The coverage as far as English periodicals are concerned is quite exhaustive. In all probability nothing important has been missed. However, this is not the case with regional language periodicals, where the coverage is inadequate and in some cases poor for the reasons given under 'limitations'.

Apart from periodicals on pure and applied sciences, periodicals on the following border-line subjects have also been covered: Museology, Psychology, Population, Standardisation, Architecture, Town Planning, Photography, Geography, Management, etc.

Periodicals like Journal of the Gujarat Research Society, Journal of the Asiatic Society, and many others, which are partially devoted to science and technology and usually contain important scientific contributions have also been covered.

Periodicals coming out till August 1947 from those parts of the Indian subcontinent which now form Pakistan and Bangladesh have also been included. Historical elements of these periodicals have been given upto August 1947 only.

Attempts have been made to cover periodicals appearing in mimeographed form also. The coverage in this case may not be so comprehensive as the printed ones.

Ghost titles (explained afterwards in the article), time tables, panchangs, telephone directories, etc. have been excluded.

METHODOLOGY - For such a compilation, the ideal method would have been to examine each and every title from its very first volume to the last volume, and to take note of all the required elements including changes. Though in a large number of cases this was actually done, but it could not be done in all the cases for various reasons. In many cases, data had to be gathered from various secondary and tertiary sources, viz. catalogues of individual libraries, union catalogues, directories of periodicals, national and other bibliographies, books and periodicals dealing with the history of scientific literature, and so on. Citations given at the end of articles also helped in detecting a few titles.

Union catalogue of periodicals are of immense value for such a compilation, inasmuch as they provide information also about less known, short lived and unimportant periodicals which are usually not found in other sources. This apart, union catalogues provide valuable information as to the sponsor, place of publication, year of starting, year of cessation in case of ceased publications, volume numbering and also depict changes in title, sponsor, and volume numbering. But, union catalogues have got their own limitations, which at times are considerable. Almost all union catalogues at times drop certain words from the title, invert the title, add certain words in the title, for the sake of uniformity, for making a standard entry, or for computer generation of various indexes. Sometimes some titles are mutilated beyond recognition, and as such original title cannot be established from the given title. A few examples of these types are provided here:

British Union Catalogue of Periodicals (BUCOP), Union List of Serials in Libraries of United States and Canada, and many others enter the periodical under the sponsor, if there is any. In the process, sometimes some words, usually prepositions are dropped, titles get inverted, and the construction of original title becomes difficult. Let us see the following entry appearing in BUCOP.

Indian Museum, Calcutta
- Department of Anthropology
-- Bulletin

Now guesses can be made as to the actual title of the periodical. It may be Bulletin of the Department of Anthropology of the Indian Museum, or Bulletin, Department of Anthropology, Indian Museum and so on. But the actual title is found to be Bulletin of the Department of Anthropology, India, which is undeniably quite different from what we can guess. This entry also shows the dropping of words, i. e. prepositions from the title, as well as the inversion of the entry. Titles of periodicals have undergone reduction of greatest proportion in the Union Catalogue V. 1 - Natural Sciences, by S.R. Ranganathan and others, rendering establishment and at times identification of the actual titles extremely difficult, if not impossible. A few examples are cited from this catalogue to demonstrate this point.

Let us take the title 'Report, Bundlekhand Station' appearing under the heading J. 4452, g AGRICULTUR (sic) STATION against the class no. J. 4452, gBur. The place name 'Bundlekhand' gave rise to some doubt, because the place which is well known is 'Bundelkhand' and not Bundlekhand. It was likely that Bundelkhand has become Bundlekhand due to printing mistake, and it was found to be so. But neither a periodical with title 'Report, Bundelkhand Station, could be traced, nor was there any evidence of Bundelkhand Station. What could be traced was a periodical with the title 'Report on the Agricultural Stations of the Bundelkhand Circle'... The holdings data given in the Union Catalogue against the periodical 'Report, Bundelkhand Stations' tallied with the actual holding of the 'Report on the Agricultural Stations of the Bundelkhand Circle... " and hence, the latter was taken for granted as the actual title of the former.

For agricultural stations of all other circles of the United Provinces of Agra and Oudh, the entries were given as Report, Eastern Circle; Report, Hill Circle, and so on, why in this particular case, the entry was Report, Bundlekhand station, instead of Report, Bundelkhand circle' is not known. Had the entry been in the latter form, the identification of the periodical would have been much simpler.

Under the heading J. 4471, g several titles are found, of which two are: Report on Demonstration Work, Northern Circle; and Report, Plateau Sub-Circle. Actual titles of these two are found to be 'Report on Demonstration Work carried out in the Northern Circle, Central Provinces and Berar'; & 'Report on Demonstration Work carried out in the Plateau Sub-Circle", respectively. Though both the Reports are on Demonstration Work, it is not clear why in one case, it has been rendered as 'Report on Demonstration Work' and in another case only as 'Report' !

Many such examples can be cited. The author is still striving to solve the riddle of some of the titles of this Union Catalogue.

While working on this project for so many years, the author at times had really wondered how on earth it was possible for a man, no other than Ranganathan, an embodiment of meticulousness, correctness and consistency, to allow a publication, edited by him, to be published with so many errors and inconsistencies !

Now it is the other way round, addition of words in the titles.

Let us take the title Balwant Vidyapeeth (Agra) Journal of Agricultural and Scientific Research. The title has been reproduced in the same way as it is given in the Regional Union Catalogue of Scientific Serials - West Bengal. The place name (Agra) is not there in the original title. It has been added to facilitate computer-aided generation of geographical index. But there are titles of periodicals, wherein place name forms part of the title, e. g. Journal of the Institution of Engineers (India). Here (India) is there in the original title. From the catalogue one cannot find out which title actually contains the place name and to which title place name has been added by the compiler.

Let us take another example, i. e. Report, Experimental Station at Cape Rouge, Que from the Catalogue of Serials in the Indian Agricultural Research Institute Library. Here the preposition 'at' before Cape Rouge has been added by the compiler to clearly show that the Station is situated at Cape Rouge.

Because of such vagaries of the entries, titles were collected first, in whichever forms they were available. Attempts were made thereafter to get the actual title. World List of Scientific Periodicals, catalogues of serials of individual libraries, union catalogues of serials brought out by INSDOC, and some other catalogues provide actual title with certain exceptions.

Raw data of scientific periodical holdings of more than 500 libraries of India, collected by INSDOC after physical verification of the periodicals also provide the actual title. To derive the actual title, all these sources were consulted. Quite often, a periodical itself was physically checked. This checking has helped in finding the actual title of a periodical as well as a few ghost titles, which were discarded.

A few examples of ghost titles are given below:

The author came across an entry, i. e. Indian Journal of Experimental Botany in the Indian National Bibliography 1963. All the details, as were given in the entry were noted. When the verification of the title was undertaken this title could not be traced. Even the sponsoring body, as was given in the INB, could not tell anything about the periodical. In all probability, this entry was made by mistake for the periodical Indian Journal of Experimental Biology !

Another title 'Bulletin devoted to the Prevention of TB' was encountered in the Press in India, Pt II, 1965-. The physical verification revealed the actual title to be 'Bulletin devoted to the Prevention of Tuberculosis', i. e., Tuberculosis in place of 'TB'

These types of erroneous titles have been termed by the author as ghost titles and have been excluded from the Bibliography.

Alongwith the verification of titles, verification of other components, viz. changes in titles, sponsor, place of publication, language of the text, date of starting, date of cessation, volume numbering, and subject were also undertaken. In the case of periodicals, every component as enumerated above except the date of starting (year or month) are changeable. Recording of all the changes have been attempted.

The date of starting at times puzzled the author. The date of foundation, the date given in the first issue, and the date of the actual publication of the first issue are in many cases not simultaneous. That is why, that date has been taken as the date of starting which was given on the title page of the first issue. In rare cases, the first issue of the periodical never appeared or appeared later than the second or third issue. In such cases, the date given on the earliest published issue has been taken as the date of starting. Of course, note has been given in the entry as to the non-appearance or the actual date of the first issue.

In some cases, the date of starting had to be derived indirectly. The simple method of determining the date of starting by subtracting the volume no. from the corresponding year and then adding 1 to that year (i. e. if vol. no. 20 corresponds to 1965, then the periodical starts in 1965-20+1 = 1946) does not work always and cannot be relied upon. Because a periodical can publish more than one volume a year or one volume in two or more years. That apart, a periodical may not have a continuous volume numbering, it may repeat the same volume numbering after years, and at times there may be a gap of several years between two successive volume numbers.

A few interesting examples of irregular volume numbering are here:

Planter's Journal and Agriculturist was coming out with volume no. 52 in the year 1960, suddenly in the same year it changed its volume no. to 37 ! Indian and Eastern Engineer had volume no. 123 in 1958, from 1959 it again started its volume numbering from 101 since the journal completed 100 years of its existence in 1958. The 1st volume of the Memoirs of the Kodaikanal Observatory was published during 1909/17, and the 2nd volume in 1967, after a lapse of 50 years !

These vagaries apart, some periodicals, especially Report, do not have volume nos. at all.

Whenever need arose to determine the date of starting indirectly, the following methods were applied.

(i) The earliest date from which the periodical was received or is being received in libraries was found out

(ii) In case, the periodical has got a sponsor the date of foundation of the sponsor was also found out.

When both the dates coincided, the date was taken as the date of starting of the periodical. In some cases, there were variations of one or two years, even then this method was helpful, inasmuch as an approximate date could be found. This method was specifically useful in the determination of the date of starting of Annual and other reports of organisations.

Of course, this method did not help in all cases. Where other methods like correspondence, checking of old records or references given at the end of articles, had to be employed.

Despite all these, the exact dates of starting could not be ascertained in many cases. In such cases, the earliest date from which the periodical was received in libraries has been tentatively taken as the date of starting. Of course, a question mark has been put after the date.

Now let us have one or two concrete cases to demonstrate how various components of an entry was determined.

The entry, Report of the Chemical Examiner, Madras was encountered in the World List of Scientific Periodicals against the serial no. 43005. It did not provide any other information as to its sponsor, place of publication, or date of starting. Undeniably this was an Indian scientific periodical, so the title was noted in a card and kept alphabetically along-with other cards. This title was again encountered in the Catalogue of Serials in the Indian Institute of Science Library, which was having the Report for the periods 1937-39, 1946-48, 1952-58. The entry in the Catalogue provided information as to its place of publication, sponsor and threw some light on its life time. All the data were noted in the card already prepared.

The information that was obtained afterwards in respect of this Report from various sources were all recorded and found to be somewhat conflicting from 1959 which can be seen from the table given in the next page.

From an analysis of the data given in the table, it was becoming evident that the title of the Report underwent a change in 1959 as well as in 1960, though the data given in the Regional Union Catalogue of Scientific Serials-Madras as well as West Bengal was speaking otherwise. So, physical verification of the title was undertaken and the surmise was found to be true. The entries given in the Regional Union Catalogue of Scientific Serials - Madras as well as West Bengal were found to be wrong. The entries of the Indian National Bibliography were correct. The entries of other sources were also correct except for the fact that the Annual Report was entered as Report following the World List pattern.

No evidence of the publication of the Report of the Chemical Examiner's Department, Madras was available from 1960 onwards. However, as is evident from the table, Report, Chemical Examiner's Laboratory, Madras was appearing from 1967. This almost looked like a riddle, inasmuch as the earlier Report was of the Chemical Examiner's Department, and this one was of the Chemical Examiner's Laboratory, appearing after a gap of a few years. The riddle was solved when the history of the Chemical Examiner's Laboratory, Madras, available in the Directory of the Scientific Research Institutions in India by T.S. Rajagopalan and others, revealed that the Chemical Examiner's Department, the Scientific Section of the CID, Madras and the Prohibition and Excise Laboratory of the Revenue Board, Madras were integrated in December 1959 to form the Madras State Forensic Science Laboratory, wherefrom Chemical Examiner's Laboratory was disintegrated in March 1967. Hence, the disappearance of the Report of the Chemical Examiner's Department for the years 1960-66 and the appearance of the Report,

Years	Title	Source
1959	Report of the Chemical Examiner, Madras	Regional Union Catalogue of Scientific Serials — Madras - do - West Bengal
1959	Annual Report of the Chemical Examiner's Department for the year 1959 and State Forensic Science Laboratory, (Dec 1959) Madras	Indian National Bibliography, 1961
1959	Report, Chemical Examiner's Department and State Forensic Science Laboratory, Madras	Union Catalogue of Social Science Serials: Delhi Pt 2
1960	Report of the State Forensic Science Laboratory and Chemical Examiner's Laboratory	Regional Union Catalogue of Scientific Serials - Madras, - do - West Bengal
1960	Annual Report, State Forensic Science Laboratory, Madras	Indian National Bibliography, 1963
1960-1969/70	Report, State Forensic Science Laboratory, Madras	Union Catalogue of Social Science Serials : Delhi - Pt 2
1961	Annual Report, State Forensic Science Laboratory, Madras	Indian National Bibliography 1963
1961-1970/71	Report, State Forensic Science Laboratory, Madras	Accessions List - India - Quinquennial Serials Cumulation 1976. V. 2
1967	Report, Chemical Examiner's Laboratory, Madras	Union Catalogue of Social Science Serials : Delhi - Pt 2
1968/69	- do -	"
1969/70	- do -	"
1967-1971/72	Report, Chemical Examiner's Laboratory, Madras	Accessions List - India Quinquennial Serials Cumulation, 1976. V. 2
1970/71	Annual Report, State Forensic Science Laboratory, Tamil Nadu	Indian National Bibliography, No. 10, 1973
1971/72	Annual Report of the Tamil Nadu Forensic Science Laboratory	Accessions List - India Quinquennial Serials Cumulation, 1976. V. 2
1972/73	Annual Report of the Tamil Nadu Forensic Science & Chemical Examiner's Laboratory	Accessions List - India Quinquennial Serial Cumulation 1976. V. 2

[Note: The Annual Report has been entered under the sponsor in all the sources, except the Regional Union Catalogue of Scientific Serials - Madras as well as West Bengal. For the sake of uniformity all the renderings here have been made in the World List pattern.]

Chemical Examiner's Laboratory, Madras from 1967. Consequent upon the change of the name of the State from Madras to Tamil Nadu in December 1968, the title of the Annual Report of the State Forensic Science Laboratory underwent a change in 1971/72 to become Annual Report of the Tamil Nadu Forensic Science Laboratory. The title underwent one more change in 1972/73, since when it has been appearing as Annual Report of the Tamil Nadu Forensic Science and Chemical Examiner's Laboratory. From 1973 the Report is appearing for the calendar year.

From the Directory of Scientific Research Institutions in India it was found that the Chemical Examiner's Laboratory was founded sometime around 1853 ! But the evidences of the Report of Laboratory was available in Indian sources only from 1922, of course, under different titles. Further search in the foreign sources yielded more data on the Report, and the earliest evidence obtained dates to 1871/72. It cannot be said with certainty whether the Report started publishing from this year or earlier. Further search is being continued to find out the actual date of starting.

Let us take another example. The periodicals, Bulletin of the Department of Anthropology, India; and Bulletin of the Anthropological Survey of India were encountered in many sources and they were found to have been entered separately with the respective holdings data. The place of publication and the date of starting for both the periodicals were found to be the same, i. e. Calcutta and 1952. This very fact gave rise to some doubts. Maybe that both the periodicals are one and the same, for sometime the periodical was having the first title and then took the second title? It is also possible that the Department of Anthropology of the Government of India, was renamed as the Anthropological Survey of India, and hence the change in the title.

The holdings data of both the periodicals were carefully examined and it was found with surprise that the holdings data of the Bulletin of the Anthropological Survey of India was starting with V. 9(1960), and the holding data of the Bulletin of the Department of Anthropology, India was ending with V. 8(1959) with some exceptions. Presumably the exceptions were due to careless recording.

The history of the Anthropological Survey of India was checked up from the Directory of Scientific Research Institutions in India to find out whether the Department of Anthropology of the Government of India was renamed as Anthropological Survey of India in 1960, but the Directory was silent in this regard.

Attempt was made to physically check issue no. 1 of Vol 9, in the hope that the issue might cast some light on the change of the title. Unfortunately the issue no. 1 was not readily available. But from no. 2 of Vol. no. 9 of the Bulletin of the Anthropological Survey of India, contents of all the volumes (Vol I-IX) of the Bulletin were available. Contents of Vol. 8 given here were compared with the contents of the Vol. 8 of the Bulletin of the Department of Anthropology, India which tallied in toto, substantiating the conjecture that the Bulletin of the Department of Anthropology, India changed its title to Bulletin of the Anthropological Survey of India in 1960. Later on, it was also confirmed that the Department of Anthropology, Government of India, was renamed as Anthropological Survey of India.

THE BOOK - Apart from the main part, the proposed book will contain title, sponsor, language and subject indexes. The main features of the main part and of the indexes are being described in brief.

Main part - The entries have been arranged chronologically starting from 1788 to 1965. Where more than one entry appear under the same year, the arrangement is alphabetically by title. Here, the arrangement could have been according to the month of starting. But this idea had to be dropped because of non-availability of months of starting in many cases, and yearly, two-yearly publications usually do not give the month of starting, moreover locating a title from the multitude of entries is much easier in an alphabetical arrangement than in any other arrangement.

Entry - An entry rehearses the title, sponsor/s, place/s of publication, language/s of the text, subject/s, date of starting and date of ceasing along with the corresponding volume numbers. e. g.

> Jnan O Bijnan. Bangiya Bijnan Parishad. Calcutta. Bengali. Science and Technology. 1(1948) +

Of course, all the entries do not have all the components. There are periodicals which published or are being published without being sponsored by any corporate body. In such cases, the entries are naturally without the sponsor/s, e. g.

> Indian Journal of Ophthalmology. Poona 1(1940)-14(1953).

> Antiseptic. Madras. 1(1904)+

Where the name of the sponsor form part of the title, the sponsor's name has not been given separately, e. g.

> Agra University Journal of Research-Science. Agra. 1(1951)+

Language/s of the text has been mentioned only in the case of multilingual and non-English periodicals.

Where the subject is evident from the title, the same has not been mentioned separately. In other cases, and specifically in the case of non-English language periodicals, the subject has always been mentioned in the entry, for the simple reason that even if the subject is known from the title, a reader ignorant of the language will not be able to make out the subject.

In the case of non-English language periodicals, titles have been presented in transliterated form in English script. Attempt has been made to retain the transliteration given by the publisher as far as possible.

Attempts have been made to render the title as in the original. But in many cases it was not possible for two reasons, (one) in some cases the original periodical could not be seen, and as such the title as was given in the source, was taken; & (two) some periodicals gave the title just as Report, or Annual Number, and so on, on the title page. In such cases, the name of the corporate body had to be added, and at times the place, where the corporate body was situated, had also to be added for making the entry specific and meaningful. Alternate titles, wherever they have been found, have been included in the title, as Samiksha - Journal of the Indian Psychoanalytical Society; Vijnan Karmee - Journal of the Association of Scientific Workers of India; Sankhya - the Indian Journal of Statistics; and so on.

Many a title, during its long or short span of life has undergone changes in various forms & in good many cases, more than once. Sometimes, a word or words has been added or dropped, at times it assumed a title totally different from the previous one and instances like one periodical merging with another loosing its own identity; two or more merging together to give birth to a new entity; or a periodical spliting into two or more sections or separate periodicals, are not at all rare in the colourful domain of Indian periodicals. Attempts have been made to faithfully reflect all the changes. Here are some examples:

(1) Journal of Madras Agricultural Student's Union. Coimbatore. 1(1912) - 16(1928). Contd as Madras Agricultural Journal. 17(1929)+

(2) Proceedings of the Institution of Chemists (India). Calcutta 1(1929) - 21(1949). Contd as Journal and Proceedings of the Institution of Chemists (India) 22(1950)+

(3) Journal of the Indian Pediatric Society. Calcutta. 1(1962) - 2(1963). Merged with Indian Pediatrics.

(4) Journal of Scientific and Industrial Research. Council of Scientific and Industrial Research. Delhi. 1(1942) - 4(1945).

1946-1954 Contd in 2 Sections as

Journal of Scientific and Industrial Research - Section A. 5(1946) - 13(1954).

In V. 5-8, Section A was not mentioned.

Journal of Scientific and Industrial Research - Section B. 5(1946) - 13(1954)

1955-1960 Contd in 3 Sections as

Journal of Scientific and Industrial Research - Section A - General.14(1955) - 19(1960)

Journal of Scientific and Industrial Research - Section B - Physical Sciences 14(1955) - 19(1960)

Journal of Scientific and Industrial Research - Section C - Biological Sciences 14(1955) - 19(1960)

1961-1962 Contd in 4 Sections & 1963- under different titles

Journal of Scientific and Industrial Research - Section A General 10(1961) - 21(1962). Contd as Journal of Scientific and Industrial Research. 22(1963)+

Journal of Scientific and Industrial Research - Section B Physical Sciences 20(1961) - 21(1962). Split into

Indian Journal of Pure and Applied Physics. 1(1963)+

Indian Journal of Chemistry 1(1963) - 13(1965). Split into

Indian Journal of Chemistry - Section A - Inorganic, Physical, Theoretical and Analytical. 14(1976)+

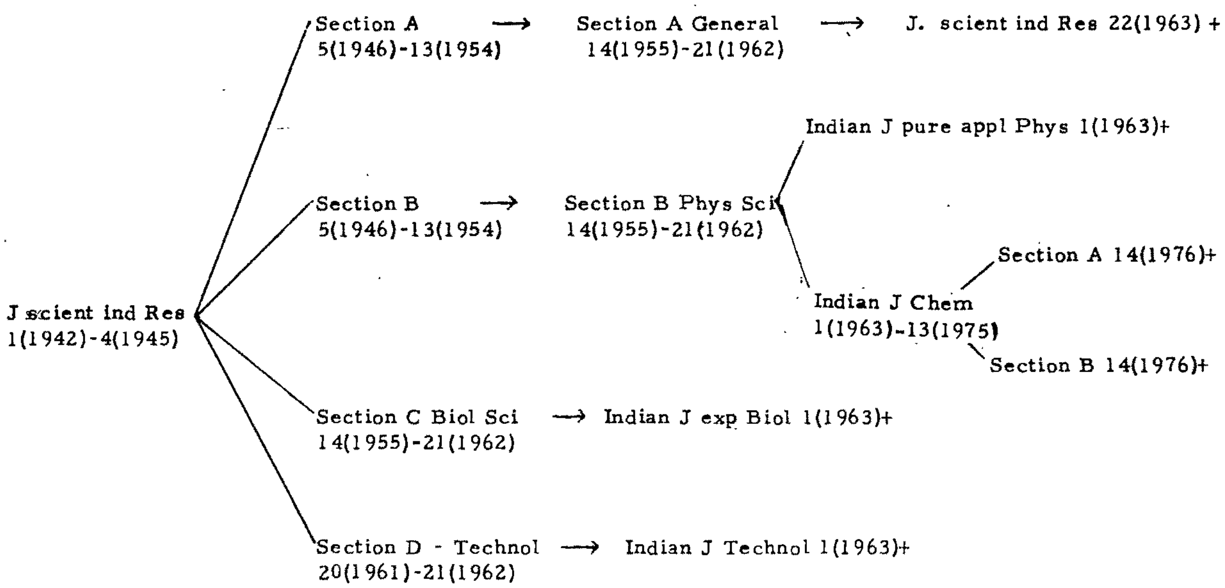
Indian Journal of Chemistry - Section B - Organic including Medicinal. 14(1976)+

Journal of Scientific and Industrial Research - Section C - Biological Sciences. 20(1961) - 21(1962). Contd as Indian Journal of Experimental Biology 1(1963)+

Journal of Scientific and Industrial Research - Section D - Technology. 20(1961) - 21(1962). Contd as Indian Journal of Technology 1(1963)+

Note: V. 14(1955) - 21(1962) of Section B & Section C were issued under one cover.

The changes of the Journal of Scientific and Industrial Research can be graphically represented as below



Quite analogous to titles, sponsors also have changed their names many a time. When the sponsor formed part of the title, the change in the name of the sponsor has been reflected in the title itself, as shown below; otherwise, the change has been shown separately.

Journal of the Madras State Electricity Board, Madras. 1(1946) - 21(1967) Contd as Journal of the Tamil Nadu State Electricity Board 22(1968) -

Journal of the Deccan Geological and Mining Society. Hyderabad 1(1961) - 3(1963). Contd as Journal of the Indian Geoscience Association. 4(1964) - 13(1971). Contd as Journal of the Indian Academy of Geoscience 14(1972) -

Some times it has been seen that a periodical has appeared from different places at different stages of its life. This has been shown in the entry in the following way.

Journal of Obstetrics and Gynaecological Society of Northern India. Lahore. 1(1940) - 4(1943) Contd as Journal of Obstetrics and Gynaecology. Lahore (1948-58 Ludhiana; 1959 - Delhi). 5(1944)-

Note: V 23 No. 12 numbered as V. 24 No. 12; V. 24 Nos. 3, 6, 7 numbered as V. 25 Nos. 3, 6, 7.

Wrong or irregular volume numberings have also been shown in the entry as shown above.

In the case of some periodicals, cumulative indexes have also been published. This information, whenever available, has been incorporated in the entry.

Indexes

The book will have title index, sponsor index, subject index, and language index

Title Index - All the titles have been arranged in one alphabetical order, with their respective serial numbers. Language/s of the periodical has been mentioned in the case of non-English language and multilingual periodicals only. Examples

Agricultural College Magazine, Annamalai University (English, Tamil)
Chikitsa Jagat (Bengali)
Dharti Ke Lal (Hindi)
Mofidul Muzarin (Urdu)
Vijnan Parishad Anusandhan Patrika (Hindi)

Sponsor Index - The index has been arranged alphabetically. Wherever possible, date of foundation of the sponsor has been provided. Changes in the nameof the sponsor has also been shown, wherever possible, with respective dates. Periodicals under the sponsor have been arranged alphabetically & titles of the periodicals have been given in full. Examples

Agricultural Research Institute and College, Pusa 1905-1916? → Agricultural Research -

Institute, Pusa 1916? - 1929. → Imperial Institute of Agricultural Research, Pusa 1929-34. → Imperial Agricultural Research Institute, Delhi 1935-46. → Indian Agricultural Research Institute, Delhi 1947+

Bulletin, Agricultural Research Institute, Pusa

Bulletin, Imperial Institute of Agricultural Research, Pusa

All Indian Institute of Medical Sciences. Delhi. 1956 -

Assam . - Sept 1905. → Eastern Bengal and Assam. Oct 1905 - Dec 1911 . → Assam. Jan 1912*

Department of Agriculture 1885. — Department of Land Records and Agriculture 1886-1905. — Department of Agriculture (Agricultural Department) 1905 -

Bulletin in the Agricultural Department, Assam

Report of the Department of Agriculture, Assam

Subject Index - This index has been arranged alphabetically topic wise, and under each topic titles have been arranged alphabetically. See and See also references, wherever necessary, have been provided.

Language Index - Multilingual periodicals appear first in this index, followed by other languages in alphabetical order. Under each language, periodicals have been arranged alphabetically. Life span of the periodical has also been shown indicating its year of starting & ceasing, (in case of ceased periodicals) to facilitate chronological study. English language periodicals have been excluded from this index, inasmuch as the title index with the exclusion of multilingual and other non-English language periodicals form the index of English language periodicals.

LIMITATIONS

It has already been mentioned that as far as English language periodicals are concerned, the coverage is quite comprehensive. It is not the case with Indian language periodicals. The sources that has been consulted over the years somehow did not reflect the Indian language periodicals to that extent, as it should have been. There might be several reasons for this. Possibly language periodicals were not subcribed by the libraries, because of their popular nature or limited use, or when Indian language periodicals were received free in a library, they were not taken good care of. It has been seen in many Indian libraries (of course, there are exceptions), where periodicals received on gratis are maltreated, for the simple reason that audit people will not ask any question about them. Short life span might be another reason. There are cases when a periodical ceased publication after the appearance of a single issue or several issues. By the time librarians came to know about the existence of the periodical, it might have ceased.

With extreme care and years of painstaking search, Brajendranath Bandyopadhyay listed in his Bangla Samayik-patra all Bengali periodicals and newspapers, with annotations that were published before 1867, when there was absolutely no bibliographical control over these publications. When one goes through the location data of these periodicals, one finds with astonishment that many of these periodicals are present not in any reputed library but in private collections. It might be the situation in the case of other language periodicals also. But attempts like the one by Brajendranath Bandyopadhyay are almost absent, in other Indian languages.

It has not been possible for the author to search the private collections of great bibliophiles or old libraries spread over the length & breadth of this vast country, for the fact that this was out and out a private venture without any support from anybody, and as such, it is likely that quite a good number of Indian language periodicals have been missed.

One more factor is the author's ignorance of many Indian languages. There may be cases, when a review has appeared about an Indian language periodical in a periodical or newspaper of that particular language. But the author could not go through such documents for his ignorance of that language and thereby failed to record such information.

The book will be published with this lacuna and with the hope that the lacuna will be gradually fulfilled in subsequent editions or supplements of the book.

PERT/CPM - ITS APPLICATION TO LIBRARY AND INFORMATION SYSTEMS

M.K.DHIRENDRA RAO
Planning & Liaison Division
National Physical Laboratory
New Delhi-110012

Introduces the PERT/CPM (Network Analysis) techniques and explains the methodology of their application. Applies CPM technique for planning and scheduling publication of an abstracting service. Suggests other areas of application of PERT/CPM techniques in library and information works. Concludes that Network Analysis is applicable to library and information works with a few exceptions like reference service.

1. INTRODUCTION

In order to solve the problems and to aid the planning of library and information works, various techniques have been used, e.g. flow charting. Programme (or Performance) Evaluation and Review Technique (PERT) is used as a planning and control technique to expedite successful completion of any project or programme. It is a modification of milestone budgeting and it uses a time-event network analysis. PERT can handle uncertainty, and has the capacity for prediction and simulation.

Critical Path Method (CPM) is also a planning and control technique but is used wherein there is certainty of time schedule, e.g. publication of an abstract bulletin. It places more emphasis on optimum utilisation of resources and reduction in overall cost. A delay in any task along this path would necessarily delay completion of the project.

Thus PERT/CPM or Network Analysis may be described as a group of techniques for presenting information relating time and resources so as to assist in analysing, planning, scheduling, and controlling projects/programmes. With the help of PERT/CPM, it is possible to follow the actual progress of the project and evaluate the propcsed alternatives with respect to cost and time.

2. ELEMENTS OF PERT/CPM OR NETWORK ANALYSIS

2.1 Activity - An activity is a clearly definable portion of a project, which could be an operation, a process or a situation consuming time and normally other resources. It lies between two events.

2.2 Events mark the completion of one or several activities at a given point of time.

2.2.1 Start Event - An event with succeeding but no preceding activities.

2.2.2 End Event - An event with preceding but no succeeding activities.

2.3 Dummy Activities - An activity which represents only an interdependency and does not consume either resources or time. In other words, when an activity on one path 'cannot be started' until the completion of another activity on a different path, the completion event of the 'must be completed' activity is joined by a dummy activity to the starting event of the 'cannot be started' activity.

Logical relationships between activities can now be represented as follows:

a) In Fig. 1, activity c may be started on the completion of activities A and B.

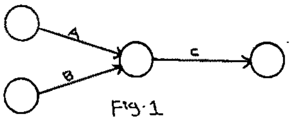


Fig. 1

b) In Fig. 2, activities B and C may be started on the completion of activity A.

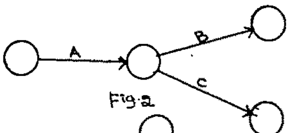


Fig. 2

c) In Fig. 3, activities B and C may start after the completion of Activity A.

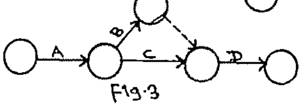


Fig. 3

Activity D can start after the completion of activities B and C.

2.4 Critical Path is the path traced by a continuous chain of critical activities from the start event to finish event; such that the sum of the activity durations is largest compared to other paths.

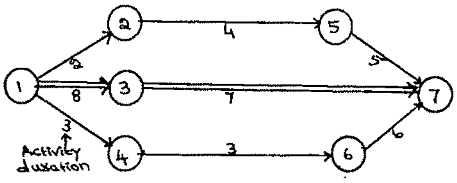


Fig. 4

There are 3 paths in Fig. 4.

I 1-2, 2-5, 5-7 = 11 days

II 1-3, 3-7 = 15 days

III 1-4, 4-6, 6-7 = 12 days

II is the critical path and project duration is 15 days.

Activities on critical path are called critical activities and they govern the project duration.

In a network, there may be more than one critical path. The paths other than critical path are called as slack paths. The term 'Slack' pertains to events only and may be negative.

2.5 Scheduling - The process of assigning calendar dates to various event timings in the network.

2.6 Crashing - In many projects the estimated project duration may be more than the target duration, in which case it is required to compress the critical path/s to achieve the target duration.

Crashing is also done to offset the indirect costs like supervisory cost, capital cost, penalties, etc. which rises with time.

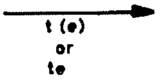
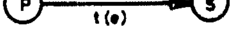
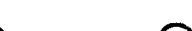
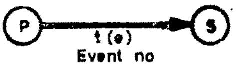
2.7 Updating - The process of periodic reviewing, reallocating resources where necessary, and redrafting the network, when the project is in actual progress.

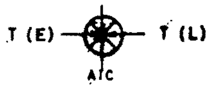
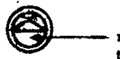
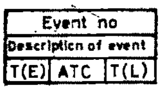
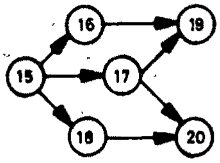
For completed activities the time is taken as zero, for activities in progress the time remaining is taken and for other activities the latest estimate value is substituted.

3. RULES AND SYMBOLS USED IN NETWORK ANALYSIS

Sl.No.	Terms	Symbol	Explanatory Remarks
1.	Optimistic time	a	-
2.	Pessimistic time estimate	b	-
3.	Most likely time estimate	m	-
4.	Expected activity time	t(e) or t_e	While rendering, t(e), T(E), and T(L) has been adopted for ease of typing
5.	Earliest event	T(E) or T_E	
6.	Latest event time	T(L) or T_L	
7.	Actual time of completion	ATC	

3. RULES AND SYMBOLS USED IN NETWORK ANALYSIS - Contd.

No.	Term	Symbol	Explanatory Remarks
8.	Activity		Time flows from the tail to the head of the arrow. The length and direction of the arrow have no significance either geographically or in terms of time The same unit of time should be used throughout the network.
9.	Representation of events		Events are represented by numbers. P & S stand for preceding and succeeding event nos.
10.	Dummy activity		
11.	Critical path activity		Can also be depicted by double line or distinctive colour.

12.	Display of event		Left-segment -- the earliest event time. T(E). Right segment -- the latest event time, T(L). and Bottom segment -- the actual time of completion of the event. ATC
13.	Interface event		reference to the same event in other networks. Entries in four segments in the top half segment would be same as for event.
14.	Milestone event		
15.	Numbering of events		All succeeding events of a given preceding event should be numbered serially from top to bottom. Succeeding events have a higher number than their preceding events.

4. PROCEDURE FOR DEVELOPING A NETWORK PLAN

A network plan is a diagramatic representation of the activities which must be undertaken and completed for carrying out a project.

The first step in network systems is to define clearly and unambiguously the goals to be reached. We must, therefore answer the following questions with a statement of premises.

a) What are the project objectives?

b) What are the major activities of the work to be performed, and their relationships?

c) How will be the division of work/responsibilities?

d) What resources, i.e. men, material, and/or machinery is available or required?

e) What are the likely information requirements of the various types and levels of management to be involved in the project?

Once these are set, then the network can be constructed, based on the logical relationships between the various tasks.

The following steps may be followed while drawing a network plan.

4.1 List separately all the activities of the project.

4.2 Indicate the immediately preceding and succeeding activities.

4.3 The next step is to draw the network which portrays each of these activities.

While drawing the network:

4.3.1 Group the activities in order of precedence.

4.3.2 All those activities which should occur simultaneously at any given instant should be put together.

4.3.3 Different processes should be arranged in the natural order in which they should occur.

4.4 Rearrange the activities in such a way that the network appearance improves, for example, see that unnecessary dummies are eliminated.

4.5 Estimate the time and resources required for each activity.

4.6 Calculate the critical path.

In brief, in the PERT/CPM technique the projects are broken down to individual events and activities and arranged in a logical network. These individual activities are then given time estimates for their execution.

5. ACTIVITY TIME ESTIMATE

There are two distinct systems of estimating activity duration. In single time estimate, which is used in CPM, the estimates are based on the past experience and averaging the time values from past records.

In 3-time estimate, for every activity, the time is estimated under three assumed situations.

The 3 times are -

1. Optimistic time (a): It is an estimate of the minimum time an activity will take, when everything goes right the first time.

2. Pessimistic time (b): It is an estimate of maximum time an activity will take - a result which would occur under adverse conditions.

3. Most likely time (m): It is an estimate of the normal time an activity will take, a result which would occur most often if the activity could be repeated many times under similar circumstances.

Activity Duration' or 'Expected Activity Time' is the time which an activity is predicted to require for its completion. It is denoted by t(e) or t_e.

There are two distinct systems of estimating Activity Duration.

In 'Single time estimate' this would be the same as the 'Most likely time', m.

The expected time for the activity under the 'Three time estimate' is given by the formula:

$$t(e) = \frac{a + 4m + b}{6}$$

3-time estimate is used in PERT.

5.2 Calculation of Earliest event time, T(E)

It is the earliest possible time at which an event can occur.

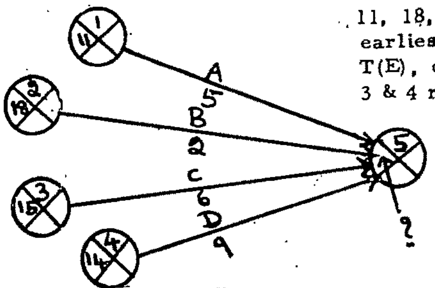
In analysing a network, the earliest event times for all the events in the network should be calculated first proceeding from the start event to the end event.

If there is only one activity preceding an event, the calculation of its earliest event time is straight forward:

Earliest event time of preceding event + estimate for the activity inbetween.

This set of calulations is called the Forward Pass.

When an event is preceded by several activities, consider all the activities merging into an event node.



11, 18, 15 & 14 are the earliest event times, T(E), of events 1, 2, 3 & 4 respectively.

Fig. 5

Event 5 in the Fig. 5 can take place earliest on:

the 16th day becuase of activity A
the 20th day because of activity B
the 21st day because of activity C
the 23rd day because of activity D

But since event 5 does not occur until all the four activities A, B, C and D are completed, event 5 can occur earliest on the 23rd day.

Thus, the earliest event time, T(E), is equal to the maximum of all the totals of the earliest event time of the preceding event and the time required for the activity inbetween.

5.3 Calculation of latest event time T(L)

It is the latest possible time at which an event should occur so that the targeted project duration is not exceeded.

The latest event times in a network are calculated backwards starting from the end event and asking for each preceding event the question - what is the latest time the preceding event can occur, once the latest event time for the succeeding event is known?

Tha latest event time for the end event is the same as the earliest event time calculated for it.

If there is only one activity flowing out from an event, its latest time calculation is straightforward:

Latest event time of the succeeding event - time estimate for the activity inbetween.

If there are several activities flowing out from an event, its latest event time must be calculated backwards from the viewpoint of each such activity.

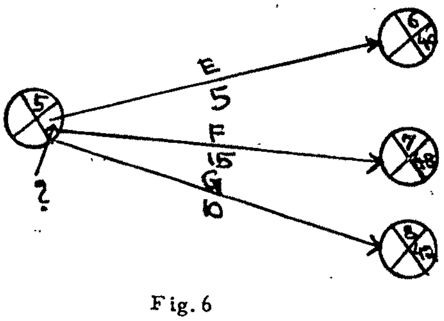


Fig. 6

Event 5 in the Fig. 6 must take place latest on:

the 35th day because of activity E
the 33rd day because of activity F
the 32nd day because of activity G

But, since neither event 6, 7 or 8 can be delayed more than the time specified against them, the event 5 must be completed latest on the 32nd day.

Thus, the latest event time is the minimum of all the values obtained by taking away the activity times from the latest times corresponding succeeding events.

The other time estimates are Earliest start time, Earliest finish time, Latest finish time, Lead time, Lag time etc.

5.4 Calculation of Floats:

Float is the play, i.e. the amount of excess time, available on any activity. There are mainly two kinds of floats.

5.4.1 Total Float, (TF)

It is the total expansion available to an activity.

Total float = (Latest event time of succeeding event) - (Earliest event time of preceding event) - (Activity time)

T(L) T(E)

i.e. Succeeding event Preceding event) -t(e)

Total float on critical activities is zero, indicating that there is no play available on critical activities.

5.4.2 Free Float (F.F): It is the amount of expansion available without upsetting the subsequest activities.

Free float = (Earliest event time of succeeding event) - (Earliest event time of preceding event) - (Activity time)

T(E) - T(E) -t(e)

i.e. Succeeding event Preceding event

The other less commonly occurring Floats are Independent float, Negative float and Interference float.

The term float pertains to activities only.

6. APPLICATION OF CPM FOR PLANNING AND SCHEDULING PUBLICATION OF AN ABSTRACT BULLETIN

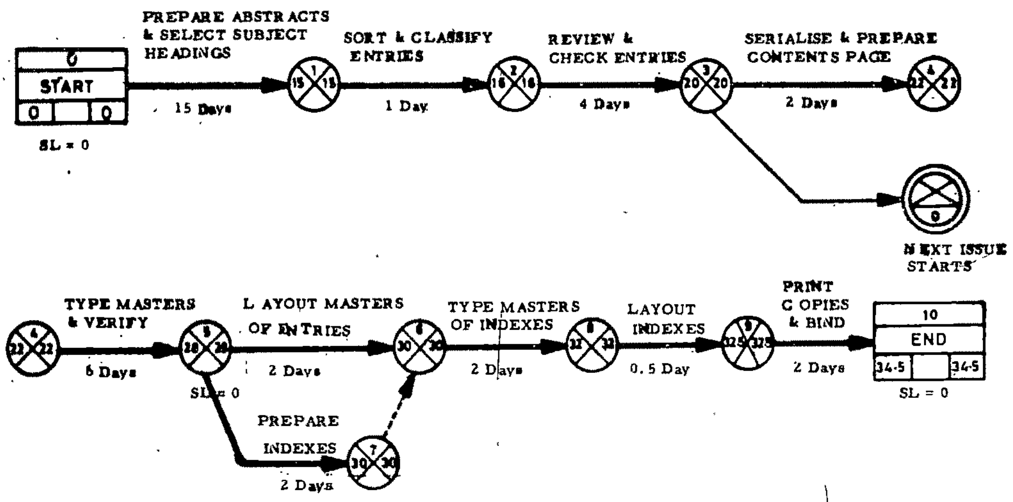
Envisage a regional Documentation Centre which proposes to bring out a monthly abstracting service of documents received by it. Let the various activities in the publication of the abstracting service be as under:

1. Receive, scan and select articles from current documents for abstracting purpose.
2. Note the complete bibliographical citation of the documents on standard slip.
3. Prepare abstract on the slip or use author abstract with suitable modifications, if necessary.
4. Conceptually analyse the document and select subject headings for indexing.
5. Collect all the abstracts and arrange, under convenient broad subject headings, alphabetically by the author's name.
6. Review and check the entries.
7. Serialise the entries and prepare the contents page.
8. Type masters of the entries and check. After correcting, release the typed sheets to printing section for laying out on plates.
9. Alphabetise the author index and subject index terms.
10. Type masters of the indexes and verify. After correcting, pass on the typed sheet to printing section for laying out.
11. Print copies of the abstract bulletin by photo-offset printing technique.
12. Collate and bind.

In the CPM network (Fig. 7), the timings for the various activities are based on the following assumptions.

1. Average number of articles abstracted is 500.
2. Number of abstractors are four.
3. Working hours is six hours/day.
4. Rate of preparation of abstracts by one abstractor is eight/day. Therefore, four abstractors can abstract 500 articles in about 15 days. (This includes the time for selection of subject headings for indexing and writing the abstracts on slips. This also assumes that in 70% of the cases the abstractor uses the author's abstract with little or no modification).
5. Two abstractors can sort 500 entries and classify under broad subject headings in one day.

Fig.7: NETWORK FOR PUBLICATION OF AN ABSTRACT BULLETIN



NOTE CRITICAL PATH IS 34.5 Days
EARLIEST EVENT TIME = 15 Days [T(E) of EVENT 1].
LATEST EVENT TIME = 30 Days [T(L) OF EVENT 6]
TOTAL FLOAT = [(30-28) -2] = 0 [TF OF EVENTS 7 AND 5]
FREE FLOAT = [(30-28) - 2] = 0 [FF OF EVENTS 7 AND 5]

6. One person can serialise the entries by author under the broad subject headings and prepare contents list in two days.

7. Typing of masters of entries by two typists followed by their verification and correction may take about six days.

8. Laying out of above masters may take about two days by two persons.

9. Alphabetisation of author index and subject index may take about two days by two persons.

10. Typing of masters of indexes by one typist, their checking and correction may take two days.

11. Laying out of indexes by two persons may take about three hours, i.e., half a day.

12. Printing and binding of average 300 copies of the abstract bulletin may take about two days by three persons.

Table I summarises the various activities in the publication of an abstract bulletin with corresponding timings involved.

Table I: Activities and timings involved in the publication of an abstract bulletin

Event No.	Activity	Activity Duration (in days)
1.	Prepare abstracts and select Subject headings	15
2.	Sort and classify entries	1
3.	Review and check entries	4
4.	Serialise and prepare contents page	2
5.	Type masters of entries and verify	6
6.	Layout masters of entries on plates	2
7.	Prepare author and subject indexes	2
8.	Type masters of indexes	2
9.	Layout indexes on plates	0.5
10.	Print copies and bind	2

6.1 Interpretation of the CPM network

The completed CPM network shows that it would take thirty four and a half working days for publishing one issue of the abstracting periodical, provided, all the activities, from start to end, take place in the required coordination and succession without any delay. It may be noted that the work for the second issue of the abstracting periodical can be started on the twenty first day of the progress of first issue. But, taking into account the regular and other government declared holidays in an year, increasing growth of contributions, and other unforseeable circumstances, the abstracting periodical may reasonably planned to be a monthly service.

6.2 Monitoring and Evaluation

It is very important that, during the implementation stage, the performance of the various activities and the progress of the work should be measured against the CPM network schedules and shortfalls, if any, should be identified and rectified.

7. AREA OF APPLICATION OF PERT/CPM IN LIBRARY AND INFORMATION WORKS

a) Building and construction work, viz., New library buildings.

b) Introduction of new services, e.g. SDI service, translation service etc.

c) Reorganisation of the existing system, e.g. adoption of revised classification scheme, moving to new building etc.

d) Major repair, overhaul and maintenance, e.g. Computer and reprographic equipment.

e) Installation of new equipment or facilities, e.g. installation of computer facility.

f) Miscellaneous preparations of annual library accounts.

8. CONCLUSION

PERT/CPM is a very versatile technique available for exploitation by information managers/executives. PERT/CPM minimises the delays, interruptions and conflicts. These techniques are very helpful in co-ordinating various jobs of the total project and thereby expedite and achieve completion of project on time. The example shown in Sec. 6 proves that PERT/CPM technique is applicable to Library and Information works. But, some areas in information science are intangible to PERT/CPM, e.g., reference service. For large quantum projects, computer can be employed very effectively.

ACKNOWLEDGEMENT

The author is grateful to Shri T.N. Rajan, Scientist, INSDOC, and Shri R.P.S. Luther, Engineer-in-Charge (PERT), NIDC, for their helpful discussions and suggestions.

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USE PATTERN OF INDIAN INSTITUTE OF TECHNOLOGY DELHI LIBRARY: A SURVEY

MRs KARUNA SAHA
Assistant Librarian (Reference)
Indian Institute of Technology Library
New Delhi-110029.

The article describes in brief, a survey conducted at the I.I.T. Delhi Library to find out the use pattern of the library and other related aspects. It starts with the purpose of data collection and explains methodology used, period of data, tabulation and the results obtained. Based on the findings, some important observations relating to the functioning of the library were made to make its services more need oriented and satisfy greater percentage of demand in a better way.

The traditional character of an academic library has been the privacy it gave to its users, who only used it in the course of their studies. This has changed now, it is realised that their interest must be aroused by coming into contact with students and faculty, going out to them or bringing them into the library to share the work [1,2]. The three major concerns of library should be:

(a) Maximization of library usage;

(b) Reasons for non-use of library by certain members of the community; and

(c) Users satisfaction and creation of conducive working environment.

Finding out about users' needs, their pattern of behaviour and creation of an environment conducive to an interaction of communication would help achieving the objective of maximum library usage. Library surveys or projects, thus become an integral part of library activity. A design oriented project gives proposal for future action in areas of resources, services, organization and management [3].

DATA COLLECTION AT I.I.T. LIBRARY

Purpose

Data were collected at the Indian Institute of Technology, Delhi Library, in the academic session of year 1971-72. The purpose was to know the quantum of library use, pressure of demand from various category of users, peak hours of library usage, even the days on which relatively higher numbers of transactions are carried out at various service points. Certain interesting trend emerged which helped the library to shape its future policies.

Methodology

Loose sheets of papers were kept at the Reference Desk near the entrance of the library. Any member entering the library was required to enter his name and status in different columns and put his signatures against them. The information was collected for a block period of two hours, starting from 8.00 A.M. in the morning to 10.00 P.M. in the evening on all working days except Sundays and holidays when the library was kept open upto 5.00 P.M. New sheets with block hours mentioned on the top were kept at intervals of two hours. In this method of data collection, a reader visiting the library three times at different block hours will be recorded thrice, but one sitting continuously for four hours will be listed only once. Hence, the total number of readers using the library at a particular time would definitely be higher than shown by the figure.

Period of Data

The data were collected in the month of August, September and October for a total of 67 reporting days. The academic session in the institute begins in the middle of July. By the end of the month, most of the readers get themselves registered and start making active use of the library. The freshers are enthusiastic discovering new horizons of knowledge and faculty members and students of other years get busy with new academic work. Holidays for Dussehra set in the middle of October and the mood of the readers and demand for library services change. The period taken was assumed to be representative of total demand during two semesters for which the institute opens.

TABULATION OF DATA

As stated earlier the purpose of data collection was to find out the following:

(a) Number and percentage of readers visiting the library daily;

(b) Number and percentage of various categories of users, visiting the library every day;

(c) Number and percentage of readers visiting the library at different intervals of hours, so as to know the peakhours of library usage; and

(d) Number and percentage of readers visiting the library on different week days, to know the days of greater library activity and transactions at service points.

To achieve the above objectives, the data were tabulated as given in the four tables Nos. 1-4.

Total Number of Visitors

The total number of visitors in each block hour were counted separately from loose sheets, and were plotted on a graph at the end of the day. The number of visitors were mentioned along Y axis and number of hours along X axis (Fig.IA, sample of daily attendance on graph). A monthly graph for each of the three months was prepared keeping the number of visitors on Y axis, but taking number of days, instead of hours along X axis (Fig. IB, sample of monthly attendance on graph).

Number of Visitors in Various Categories

From the description given in the status column in block hourly sheets, users under various categories were counted separately, and a monthly total for each is given in Table-2.

Total Number of Visitors in Two Block Hours

Since daily graphs were prepared on hourly basis, it was possible to give figures of hourly visits for two block -hours i.e. 8.00-10.00 AM, 10.00 AM-12.00 Noon, 12.00 Noon-2.00 PM, 2.00 PM - 4.00 PM, 4.00 PM - 6.00 PM, 6.00 PM - 8.00 PM, 8.00 PM - 10.00 PM for each month. The hourwise pattern of attendance for each months is given in Figs. 2A, 2B and 2C

Total Number of Visitors on Different Week Days

Since the daily graphs of total visits were prepared mentioning dates and days, it was possible to give figures for total visits on each week day for all the three months. Pattern of visits on different week days for each month is shown in Figs. 3A, 3B and 3C.

INTERPRETATION OF DATA

Given at the end are the four tables of total figures, showing average and percentage figures for different aspects of library use and results shown by them.

Users

Table 1, gives the total number of readers visiting the library for a total of 67 reporting days and highlights certain points.

The following results are derived from Table 1:

(a) On an average 15 per cent of total enrolled members visited the library daily; and

(b) The percentage of visits were higher i.e. 17 per cent when the session began and started declining with the approaching of holidays etc. Only 10 per cent of total enrolled members visited the library during the reporting period in the month of October.

Category of Users

The use made of the library by various categories of its user community is shown at Table-2.

The following conclusions can be arrived at from Table 2:

(a) The maximum use of the library was made by postgraduates including research scholars followed by undergraduates;

(b) Only 6 per cent of faculty members made use of the library whereas 24 per cent of postgraduates and 13.5 per cent of undergraduates made use of the library during the same period. In the other category of members 11.2 per cent were using the library;

(c) In terms of daily average only 14 faculty members visited the library as against 158 postgraduates, 163 undergraduates and 71 in the category of others; and

(d) The phenomenon of less use of library by faculty members appeared surprising in a technological institute engaged in advanced areas of research.

Traffic Pattern

The traffic pattern of the library is given in Table 3.

The following becomes evident from Table 3:

(a) Wednesday seemed the day of heaviest use i. e. an average 578 members used the library followed by 546 on Monday, 471 on Thursday and 449 on Tuesday;

(b) In terms of percentage 21 per cent of total enrolled members made use of the library on Wednesday, 20 per cent on Monday, 17 per cent made use on Thursday and 16 per cent on Tuesday. On Sunday only 5 per cent visited the library as against the 15 per cent of daily attendance;

(c) The use of the library seemed to follow a pattern i. e. use of the library was less on Tuesday than on Monday, it rose to maximum on Wednesday and fell again on Thursday;

(d) From Friday the use went on declining constantly and on Sunday the use of the library was almost one fifth of the use on peak day i. e. Wednesday. The use was little higher on Saturday, but this might be due to longer hours of opening; and

(e) The average use of the library on different week days is depicted in figure 4. The curve obtained in Figure 4, clearly substantiates this pattern of use of the library on week days.

Hourly Rush

The hourwise use of the library is given in Table 4.

The following conclusions can be derived from Table 4:

(a) Similar to use of library on week days, the period of heaviest use seemed to follow an interesting definite pattern. The maximum use of the library was made at opening hours i. e. 8.00 AM to 10.00 AM and after that it went on declining at regular intervals;

(b) On an average 151 readers visited the library between 8.00 - 10.00 AM and the declining figure for later hour was 94, 56, 54, 27, 23, 18 readers for between 10.00 AM – 12.00 Noon, 12.00 Noon – 2.00 PM, 2.00 PM – 4.00 PM, 4.00 PM – 6.00 PM, 6.00 PM – 8.00 PM and 8.00 PM – 10.00 PM respectively.

(c) In terms of percentage, only 83 per cent and. 64 per cent of total enrolled members made use of the library during the last four hours of its opening as against almost 6 per cent members using during first four hours of its opening.

(d) Between 6.00 PM – 8.00 PM and 8.00 PM – 10.00 PM, in the evening, the number of users were one fifth and one eighth of the peak hours respectively.

(e) The same results have been clearly depicted in Figure 1A. The cure showing the hourly use is constantly declining after the opening hours and tend to be nearer the X axis at the end, showing the negligible use made of the library at late hours.

OBSERVATIONS

In view of the results obtained by the data compiled in four tables, the following observations regarding the working of the library were made:

(1) Since 15 per cent of total members enrolled visited the library daily and percentage of two hourly visits varied between 6 percent to 1 per cent, though estimate of number of seats in proportion to potential users vary too much, it would be satisfactory if 10 per cent of total users could be accommodated at any point of time.

(2) Maximum use of the library was made by the postgraduate students including research scholars. It is essential to ensure that:

(a) An area of quiet study including few cubicles is made available to them in proportion to their numbers.

(b) Sufficient number of indexing, abstracting, and research periodicals are provided to meet their demand.

(c) Exclusive attention is given to satisfy their special needs such as procurement of publications not available in the library on inter-library-loan, procurement of special kind of material, such as patents, theses, technical reports from national as well as international sources.

(d) Facilities for quick duplication of material such as photocopying, microfilming, microfilm printing, photographing etc. are provided.

(3) Second in the category of users were undergraduates. It is essential to ensure the following to make their visits to the library more fruitful.

(a) Number of text-books available are in proportion to the number of students taking a particular course.

(b) Number of books in the Book Bank are sufficient to meet the demand of all aspiring students.

(c) Adequate facilities for reservation of text books as well as books in the general circulation exist so as to ensure their fair use.

(4) The use of the library by the faculty seemed rather on the low side. Steps should, therefore, be taken to make the library services more attractive and valuable to them. Special information services such as 'Current Awareness Service', 'Selective Dissemination of Information' should be started. Channels of proper feedback should be created so that library plays the role of a major communication channel with its intellectual community.

(5) The traffic pattern showed that the first four days of the week had greater demand than the last three. The service points such as Reference, Text Books, Lending should be provided with more manpower on these days than on the last three days of the week.

(6) Hourly use of the library also followed a particular pattern, with usage being maximum at the opening two hours and subsequent hours. The development of staff available at this time and less at other hours i.e. between 2.00 PM - 4.00 PM and 4.00 PM - 6.00 PM when the usage was one third and one fifth of the usage at peak hours respectively. The system of development of staff in which maximum staff report during these hours due to evening shift should be reviewed.

(6B) Between 6.00 PM - 8.00 PM and 8.00 PM - 10.00 PM when only .83 per cent and .64 per cent of the total members made use of the library, a minimum of 10 per cent of total library staff is put on duty to serve them. This has reflection on the working of the library during morning hours when the demand for the services is maximum. The situation should be reviewed to make arrangements whereby a minimum percentage of staff is employed to satisfy the insignificant percentage of users in the evening hours.

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MONTH OF AUGUST No. of Readers/Hourwise

Date	Day of Month	8 - 10 AM	10 AM - 12 Noon	12 Noon - 2 PM	2-4 PM	4-6PM	6-8PM	8-10 PM	Total
5	Thursday	205	69	120	20	4	13	3	440
6	Friday	81	18	21	5	-	-	-	125
7	Saturday	160	80	43	16	13	7	10	329
8	Sunday	78	40	3	5	-	-	-	126
9	Monday	220	199	154	120	10	10	16	729
10	Tuesday	200	178	106	101	25	27	20	657
11	Wednesday	280	200	120	140	40	20	30	830
12	Thursday	260	120	120	80	20	17	-	617
13	Friday	60	20	40	27	-	-	-	147
14	Saturday	20	47	17	38	20	22	27	191
15	Sunday	-	-	-	-	-	-	-	-
16	Monday	180	108	122	90	22	17	21	560
17	Tuesday	160	120	80	60	35	20	18	493
18	Wednesday	240	260	140	120	40	20	5	825
19	Thursday	200	160	100	60	40	20	20	600
20	Friday	180	140	100	80	20	15	22	557
21	Saturday	110	80	60	20	23	10	20	323
22	Sunday	60	60	40	30	-	-	-	170
23	Monday	260	160	80	60	40	20	20	640
24	Tuesday	210	140	60	40	20	20	10	500
25	Wednesday	240	100	100	50	40	45	20	595
26	Thursday	200	120	20	40	40	40	20	480
27	Friday	160	120	100	80	80	20	10	515
28	Saturday	120	100	20	20	41	17	21	339
29	Sunday	60	20	20	30	-	-	-	130
30	Monday	200	80	40	100	20	42	20	622
31	Tuesday	180	40	80	80	30	20	15	545
27 days		4324	2979	1906	1518	563	447	348	12085

FIG. 2(A)

No. of Readers visiting the library for the month of August.

MONTH OF SEPTEMBER No. of Readers/Hourwise

Date	Day of Month	8 - 10 AM	10 AM - 12 Noon	12 Noon - 2 PM	2-4 PM	4-6PM	6-8 PM	8-10 PM	Total
1	Wednesday	240	70	100	60	60	20	30	580
2	Thursday	180	100	40	100	40	15	25	500
3	Friday	260	160	40	15	15	15	24	654
4	Saturday	200	40	30	40	5	10	5	330
5	Sunday	43	28	40	21	-	-	-	132
6	Monday	140	130	80	73	20	15	20	478
7	Tuesday	200	120	30	40	19	13	10	438
8	Wednesday	200	140	60	60	20	40	29	549
9	Thursday	200	80	80	65	21	51	28	525
10	Friday	320	120	80	60	40	15	30	665
11	Saturday	100	60	40	60	47	38	-	305
12	Sunday	120	20	20	29	-	-	-	189
13	Monday	245	60	80	100	28	20	41	574
14	Tuesday	200	80	60	83	20	20	20	483
15	Wednesday	140	60	70	70	30	20	7	397
16	Thursday	260	140	50	60	35	35	15	595
17	Friday	160	80	40	60	40	25	20	425
18	Saturday	150	50	25	28	25	25	12	315
19	Sunday	25	28	20	30	-	-	-	103
20	Monday	180	120	100	80	20	23	35	558
21	Tuesday	140	125	25	90	20	30	21	451
22	Wednesday	220	85	65	80	27	25	25	327
23	Thursday	160	180	40	80	20	18	20	540
24	Friday	200	120	100	40	40	20	20	518
25	Saturday	120	40	40	13	10	17	17	257
26	Sunday	25	20	19	20	-	-	-	84
27	Monday	60	120	70	20	20	20	27	337
28	Tuesday	80	30	15	7	-	-	-	132
29	Wednesday	-	-	Not recroded	-	-	-	-	
30	Thursday	40	50	20	13	-	-	-	123
29 days		4608	2516	1479	1622	622	575	481	11758

Fig. 2(B)

No. of Readers visiting the library in the month of September

MONTH OF OCTOBER No. of Readers/Hourwise

Date	Day of Month	8 - 10 AM	10 AM - 12 Noon	12 Noon - 2 PM	2-4 PM	4-6 PM	6-8 PM	8 - 10 PM	Total
1	Friday	140	80	20	20	20	20	15	315
2	Saturday	80	20	25	20	-	-	-	145
3	Sunday	80	20	25	21	-	-	-	146
4	Monday)								
5	Tuesday)			HOLIDAYS	CLOSED				
6	Wednesday)								
7	Thursday	130	100	40	35	60	20	10	395
8	Friday	100	60	40	60	40	20	10	330
9	Saturday	80	60	35	25	10	15	12	237
10	Sunday	16	9	25	5	-	-	-	55
11	Monday	140	100	50	50	25	25	25	415
12	Tuesday	80	80	40	80	35	20	10	345
13	Wednesday	100	40	40	40	25	28	10	323
14	Thursday	130	80	45	90	17	20	10	392
15	Friday	100	90	20	40	20	20	10	300
12 days		1176	779	405	486	252	188	112	3398

FIG. 2(C)

No. of Readers visiting the library for the month of October

MONTH OF AUGUST No. of Readers/Week Days

No. of days	4 Monday	4 Tuesday	3 Wednesday	4 Thursday	4 Friday	4 Saturday	4 Sunday	27 Total Days
No. of Readers	729	657	830	440	125	329	126	
	560	493	825	617	147	191	Holiday	
	640	500	595	600	557	323	170	
	622	545		480	515	339	130	
Total Readers	2551	2195	2250	2137	1344	1182	426	- - 12085

Fig. 3(A)

No. of readers visiting the library for the month of August.

MONTH OF SEPTEMBFR No. of Readers/Week Days

No. of days	4	4	4	5	4	4	4	29
No. of Readers	478 574 558 337	432 483 451 132	580 549 397 527	500 525 595 518 123	654 665 425 540	330 305 315 257	132 189 103 84	
Total Readers	1947	1498	2053	2261	2284	1207	508	11758

Fig. 3(B)
No. of readers visiting the library for the month of September

MONTH OF OCTOBER No. of Readers/Weeks Days

No. of days	1	1	1	2	3	2	2	12
No. of Readers	415	345	323	395 392	315 330 300	146 237	145 55	
Total Readers	415	345	323	787	945	383	200	3398

Fig. 3(C)
No. of readers of the library for the month of October

TABLE 1

Number of Readers Visiting the Library (Total No. of readers registered: 2770)

Reporting period	Total No. of Readers	Total No. of days	Average per day	Percent of readers
Aug. 1971	12085	26	464	17
Sept. 1971	11758	29	405	15
Oct. 1971	3398	12	283	10
Total:	27241	67	406	15

TABLE 2

Number of Readers Visiting the Library / Categorywise (Total No. of Readers Registered: 2770)

Category of Readers	No. of Readers				No. Regis-tered in each Category	No. of Days of Month				Average No. Readers				Percent of Readers
	Aug.	Sept.	Oct.	Total		Aug.	Sept.	Oct.	Total	Aug.	Sept.	Oct.	Total	
Under-graduates	5278	4334	1332	10944	1228	26	29	12	67	203	149	111	163	13.5
Post-graduates	4524	4495	1584	10603	672	26	29	12	67	171	155	132	158	24
Faculty	390	348	192	930	240	26	29	12	67	15	12	16	14	6.01
Others	1893	2581	290	4764	630	26	29	12	67	77	89	24	71	11.2
Total	12085	11758	3398	27241	2770	104	116	48	268	116	101	70	406	15

TABLE 3

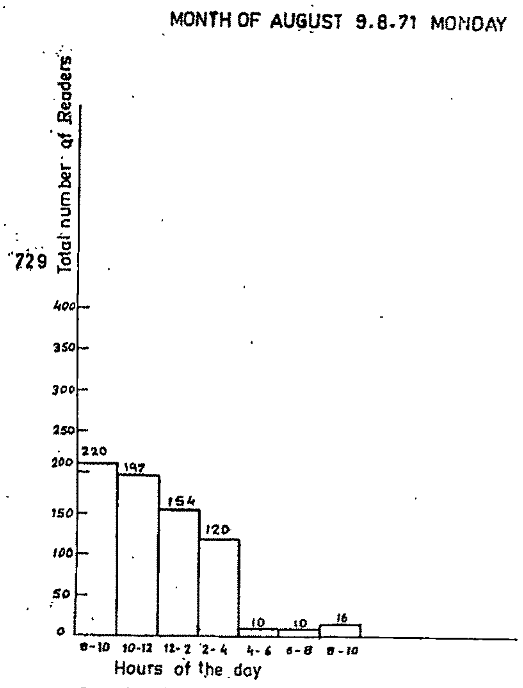
Number of Readers Visiting the Library/Week Days (Total No. of Readers Registred: 2770)

Days of Week	No. of Readers				No. of Week Days				Average No. of Readers				Percent of Readers
	Aug.	Sept.	Oct.	Total	Aug.	Sept.	Oct.	Total	Aug.	Sept.	Oct.	Total	
Monday	2551	1947	415	4913	4	4	1	9	638	487	415	546	20
Tuesday	2195	1498	345	4083	4	4	1	9	549	375	345	449	16
Wednesday	2250	2053	323	4626	3	4	1	8	750	513	323	578	21
Thursday	2137	2261	787	5185	4	5	2	11	534	452	394	471	17
Friday	1344	2284	945	4573	4	4	3	11	334	566	315	416	15
Saturday	1182	1207	383	2772	4	4	2	10	246	302	192	327	12
Sunday	426	508	200	1134	3	4	2	9	142	127	100	126	5
Total	12085	11758	3398	2741	26	29	12	67	464	405	325	406	15

TABLE 4

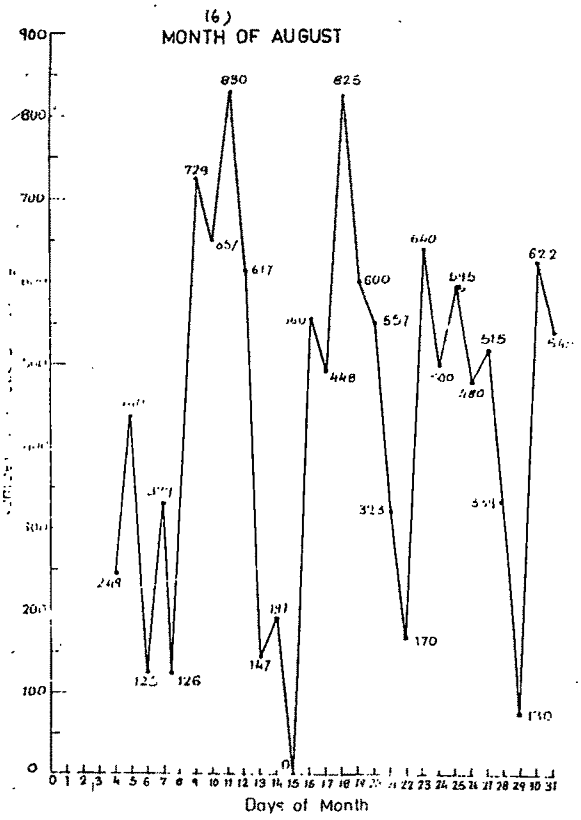
No. of Readers Visiting the Library/Hourwise Per Two Hours (Total No. of Readers Registered: 2770)

Hours of Days	No. of Readers Aug.	Sept.	Oct.	Total	No. of Days of Month Aug.	Sept.	Oct.	Total	Average No. of Readers Aug.	Sept.	Oct.	Total	Percent of Readers
8.00-10.00 AM	4324	4608	1176	10108	26	29	12	67	166	159	98	151	5.4
10.00-12.00 Noon	2979	2516	779	6274	26	29	12	67	114	87	65	94	4
12.00 Noon - 2.00 PM	1906	1479	405	3790	26	29	12	67	73	51	34	56	2
2.00-4.00 PM	1518	1622	486	3626	26	29	12	67	58	56	40	54	2
4.00-6.00 PM	563	622	252	1437	21	23	9	53	27	27	28	27	1
6.00-8.00 PM	447	575	118	1210	21	23	9	53	21	27	21	23	.83
8.00-10.00 PM	348	481	112	941	21	23	9	53	16	21	12.5	18	.64



Sample of daily attendence

Fig.1(A)



Sample of Monthly Attendence

Fig.1(B)

BIORESEARCH PLANNING AND INFORMATION NEEDS FOR BIOMEDICAL SCIENTISTS IN INDIA

I. N. SENGUPTA
Indian Institute of Experimental
Calcutta-700032.

Some problems for the information support to bioresearch planning in India are discussed and some solutions suggested. The bioresearch institutions and information centres in this field need to be properly integrated for the timely exchange of information.

Introduction

During the second quarter of this century due to vigorous growth of research activities in all spheres of science and technology, publication of research results started increasing exponentially. A radical change was consequently produced in the pattern of publication of various medium for recording scientific communications. Presently there is a trend towards publication of new serial publications. They are meant to publish promptly short or complete reports, and reviews on a well defined specific area of knowledge. In the field of biomedical sciences; the following titles are of this nature; Biochemical & Biophysical Research Communications, Biochemical Engineering, Biochemical Genetics, Biochemical Medicine, Biochemical Pharmacology, Biochemical Society Transactions, Biology of Reproduction, Biomedical Communications, Biomedical Engineering, Bio-organic Chemistry, Biophysical Journal, Biophysics, Biopolymers, Biotechnology and Bioengineering, Communications in Psychopharmacology, Comparative Biochemistry & Physiology, Current Clinical Chemistry, Environmental Physiology & Biochemistry, European Journal of Biochemistry, European Journal of Immunology, European Journal of Pharmacology, European Journal of Neurology, F E B S Letters, Fertility and Sterility, Genetika, Immunochemistry, International Journal of Biochemistry, International Journal of Fertility, International Journal of Radiation Biology, Journal of Membrane Biology, Journal of Molecular Biology, Journal of Molecular Medicine, Journal of Molecular Structure, Journal of Neurochemistry, Journal of Neurophysiology, Journal of Steroid Biochemistry, Molecular Biology, Molecular & Cellular Biochemistry, Molecular Pharmacology, Neurobiology, Neurochemical Research, Neuroendocrinology, Neuropharmacology, Neurophysiology, Neuropsychologia, Neuroscience & Behavioral Physiology, Neuroscience Letters, Nucleic Acids Research, Photochemistry & Photobiology, Plasmid, Preparative Biochemistry, Psychoneuroendocrinology, Psychopharmacologia, Sub-Cellular Biochemistry, Trends in Biochemical Sciences. Another practice that has become common in the publication of scientific journals is that the well established journals either multiply in number of volumes per year (e.g. F E B S Letters from one volume in 1968 to twelve volumes in 1978; European Journal of Biochemistry from two volumes in 1967 to eleven volumes in 1976; Biochemical Journal from two volumes in 1958 to eigth volume in 1975 and so on) or split into separate titles from the original one (e.g. Infection and Immunity has been split from the mother journal 'Journal of Bacteriology' etc.) covering narrower subject areas in order to cope with the flow of communications received for publications.

Further, if a careful study of the successive editions of the "World List of Scientific Periodicals", is made it will be seen that the rate of growth of scientific periodicals was over 108 per cent, during the twenty-nine years ending in 1952. The total number of periodicals covered from 1900 to 1921 was 25.000, 36,000 in the 2nd edition in 1933, it was 50,000 in the Third edition covering the period upto 1950, and it had increased to 59,961 by 1960 when the fourth edition came out, while it has become nearly 70,000 in 1968. If the present trend continues it is expected that the total number of periodicals in the World list may reach 100.000 by the end of the current century. All this increase in the number of scientific periodicals is the continuation of the process of 'literature explosion' which has started in the late 50s of this century. Its results have serious implications to research workers as well as to librarians. The former are badly affected by the rapid growth of original scientific literature and find it extremely difficult to keep in touch with recent thoughts in their particular field. The librarian faces a twofold problem; firstly, in working out his acquisition policy for periodicals for the use of his potential readers with his budget resources more or less stationary in the face of mounting subscription costs and ever increasing number of research periodicals relevant to any given area; secondly, information scanning from such a large number of related periodicals in the field and selecting all nascent information of relevance to the research workers which it has become his function to place before them. This is the general condition now-a-days prevailing in all developing areas of scientific knowledge.

Impact of Literature Explosion on Biomedical Sciences

The impact of 'literature explosion' on biomedical scientist has been very severe. The emergence of new concepts like molecular microbiology, molecular genetics, molecular pharmacology, molecular biophysics, biochemical pharmacology, bacterial genetics, biomedical genetics, biophysical chemistry, cellular and sub-cellular biochemistry, membrane biology, enzyme engineering etc have set off vigorous research activities during the last few decades in the field of biomedical sciences. Most bioresearch projects would be connected with these newly developed frontier disciplines and that is why bioscience is to a unique degree multidisciplinary in nature. The growth of biomedical literature can be well understood from the study of coverage of Chemical Abstracts (CA), Biological Abstracts (BA), Index Medicus (IM), Excerpta Medica (EM) etc. In 1976 out of a total of 381,152 abstracts covered in CA, abstracts relating to biochemistry alone came to 136,200 (35.7%). The total number of abstracts in BA has increased from 14,506 in volume 1, 1926-27 to 140,000 in volumes 61-62 in 1976 covering 8,312 bioscience and related serial publications. In addition, BIOSIS in 1976 covered 100,000 index entries in their 'Bioresearch Index' covering nearly 3000 informational titles collected from various symposia; review periodicals; translated journals; nomenclatural rules; letters; notes; technical data reports; natural history journals; annual institutional reports; bibliographies and guides; and trade journals in the field of biological sciences. The number of entries in 'Index Medicus has gone up to 270,000 in volume 17, 1976 covering 2500 primary biomedical periodicals from 125,000 entries in 1960, volume 1 covering 1800 periodical titles. Growth of biomedical literature as evidenced from Excerpta Medica may be of great importance. In the year of its inception i.e. 1947, it published only 8 sections and covered in all 9297 abstracts. While in 1974, the number of sections pulished by the Excerpta Medica became 43 covering more than 3500 biomedical periodicals and the total number of abstracts published in all these sections was 319,420. Presently, it is being published in 47 sections and regularly screens 4400 biomedical periodicals and number of abstracts published altogether annually exceeds 350,000.

Current Contents: Life Sciences, on the other hand, provides contents pages of 1000 bioscience periodicals as an advance information source in the field of life sciences. All these give indication of the vigorous growth of research activities in this specialized area of knowledge. Apart from this unprecedented growth of biomedical literature, multidisciplinary nature of the subject has created further difficulties in satisfying information needs of biomedical scientists.

The multidisciplinary nature of biological research can be best illustrated by considering a specific project such as Enzyme engineering in the Indian Institute of Experimental Medicine, which involves disciplines like biochemistry, biophysics, physical chemistry, synthetic organic chemistry, microbiology, immunology, and pharmacology. Thus to satisfy the information needs of the bioscientists it is necessary to select all published information by informed literature search and unpublished information by tapping right sources at the right time, as well as to cover similar information sources in other related areas and frontier disciplines. Because of this it becomes absolutely impossible for the library of any research institute or National Laboratory of India with its limited financial resources which hardly cover the costs of subscription to core primary and secondary periodicals, to procure all related information published or unpublished, covering such a wide spectrum of multidisciplinary knowledge communicated through thousands of primary publications and other sources in the library for the use of their scientists. Further, even the most expensive giant secondary periodicals in the field like CA, BA, IM, EM cannot be of major help in fully meeting the information needs of the biomedical scientists in India. Information in the form of abstracts or titles will be of little help to them because: (i) information in the form of abstracts cannot substitute for the full paper; (ii) full details and methodology cannot be known because of non-availability of journals at hand in most cases wherefrom the abstracts have been prepared due to reasons stated earlier; (iii) relevant information located from secondary periodicals will by the time they reach the concerned scientists in India obviously become to some extent back dated as on an average there is a time-lag of 6 to 9 months in abstracting in the field of biological sciences from the date of publication of that information in their primary sources, keeping aside another 3 to 6 months as transit time for these journals (both primary/secondary) to reach India from the USA, Netherlands and other countries by sea-mail, as air mail subscription is a costly affair.

In the existing conditions it is really difficult to fulfil the information needs of the Indian biomedical scientists who in order to keep up their tempo of research must remain confident that they are in constant and upto the minute touch with all relevant information.

Planning of Bioresearch in India

For assessing the information needs of biomedical scientists in India, it is necessary to identify different areas where biomedical research may be planned in India. Again there are two phases in bioresearch planning as in any other research planning; (i) Identification of problems; (ii) Planning and execution of research on identified problems.

The identification of various bioresearch problems is now being geared to the national needs and national programmes i.e. bioresearch problems should be of direct relevance to the socio-economic structure, exploiting materials and man power resources available in the country and as such be distinctive to our country. Our bioresearch programmes cannot be just copied from the plans and programmes of any other developed or developing country. This is because of the distinctive characteristics of the Indian condition where the climate is tropical with plentiful sunshine available through most of the year, adequate rainfall in most parts of our country that helps rapid growth of tuber and other crops forming rich sources of inexpensive carbohydrates, a long coast line giving access to exploit our vast maritime wealth for the economic upliftment of the country, a large human and cattle population and so on.

These particular features suggest that the country's research projects may be predominantly concerned with such problems as: Biological means of harnessing solar energy; fermentation of carbohydrate materials; biophysical methods for development of biological fuel cells; utilization of non-edible agricultural products (such as lectins, phytohaemagglutins, dihydroxy-phenylalanine etc.) for industrial, therapeutic or scientific purpose; bye-product of animal husbandary e.g. bulk isolation of therapeutically useful hormones and enzymes like glucagon and plasmin from slaughter house wastes; fermentation technology e.g. fermentative methods for the large scale production of methionine; biochemical engineering projects designated to exploit the situation arising from our large population, e.g. preparation of biochemicals from hospital wastes and agricultural products; development of marine biology to exploit India's vast maritime resources. India with its variegated flora should be a pioneer country for research on medicinal plants if proper planning is done to exploit our vast plant wealth for the production of drugs and intermediates for chemical industry, for example Yams of Dioscorea deltoida and Dioscorea prazeri contain valuable sources of diosgenin for the development of the steroid industry for production of sex hormones, the corticosteroids and non-~~steroid~~ oral contraceptives. Further, looking at the problem of planning from the view point of needs, leaving aside special resources, plans need to be oriented for the benefit of health and welfare of the vast population of the country, to tackle the problems of tropical diseases like cholera, malaria, filariasis, typhoid etc. Thus research has to be carried out to develop single shot vaccines (e.g. cholera-typhoid, etc.); development of diagnostic aids based on the use of immobilized enzymes e.g. glucose strips and immobilized urease for the estimation of urea which due to simplicity of the techniques is ideally suited to reduce diagnostic service-cost in rural health centres and in urban areas; methods of simple diagnosis e.g. enzyme linked assays of antigens and antibodies and improvement of therapy through the use of liposomes to target drugs to the site of pathology; projects also need to be taken up to study and solve problems like toxaemia of pregnancy promoting maternal welfare; and for promotion of family and child welfare organized research needs be conducted in both the therapeutic and preventive aspects of malnutrition, reproductive biology for population control, and also for mental retardation, including genetic counselling.

The plans for Indian bioscientists' information needs have to be prepared keeping in view the area of research activities, some of which have been enumerated above.

Some of the Shortcomings

The main shortcomings in meeting information needs for bioresearch planning in India are:

i) Absence of any comprehensive list of identified bioresearch problems of national relevance with sufficient clarity of definition in the science and technology plan of the country;

ii) Paucity of reliable statistics about production, demand, cost benefit analysis and market potential;

iii) Non-availability of comprehensive published information at a central place in India immediately after publication i.e. through air mail service;

iv) Delay in getting all foreign patent literature in the field of biomedical sciences at a central place; and

v) Cost factor and delay in getting translated text of papers published in languages other than English.

Solution Suggested

Though the giant abstracting and indexing periodicals like the Chemical Abstracts, Biological Abstracts, Bioresearch Index, Index Medicus, Excerpta Medica, Current Contents: Life Sciences etc. are time-related tools, indispensable for surveying the literature, these do not by themselves provide a complete answer to the information needs of the Indian bioresearch scientist.

Perhaps the most important measure for meeting the information needs of the individual scientist would be the provision of an adequate documentation service in our own research institutions, for the continuous scanning and selection of relevant information to form the basis of up-to-the-minute bibliographies on specific subject areas of interest, which alone can give our working scientists the necessary confidence to step out boldly and imaginatively into frontier areas of research activities, free from the inhibition due to fear of being anticipated in the discovery and publication of scientifically significant results. Due to ever increasing volume of published literature in all areas of scientific, particularly biological, research, a well planned supporting documentation service under the leadership of an efficient information scientist with adequate subject background is indispensable to leave the research personnel/scientist free to devote his time to actual research.

It is urgently needed to have a complete collection of primary (including translated) and secondary biomedical periodicals and all patent literature pertaining to this area of knowledge by air mail at a central place in India wherefrom after proper and speedy documentation work, a weekly classified documentation list of contents pages of these journals will be circulated to various biomedical research institutes/laboratories of the country scientists may make a broad selection of the titles of papers relevant to their interest and get reprographic copies of the complete text from that central place on request at a nominal charge.

It is necessary to explore the feasibility of organizing direct on-line linkage with international agencies like MEDLARS (Medical Literature Analysis and Retrieval System) Excerpta Medica Foundation, Ca, BA, etc. at a central place in India sothat comprehensive computerized information in the field of biomedical sciences stored in the magnetic tapes or data bases of these agencies may be readily available to the Indian biomedical scientists through the Indian central organization in the quickest possible time at minimal cost.

Thirdly, attempts should be made to procure unpublished technical information, trade literature, catalogues, technical/annual reports and other materials for research from various multi-national bioscience industries for their Indian counterparts who are engaged in similar type of production work to fulfil the information needs of Indian bioresearch workers.

In respect of information exchange among laboratories with the same or similar research interest, the organization of a preprint exchange programme has proved most fruitful. In fact, in many frontier areas of research like particle physics or enzyme engineering, working scientists have come to depend increasingly on preprints as their main source of information on advances in their field of interest. With the increase in the number of research papers submitted to journals for publication, the time-lag between submission of a paper and its appearance in print has steadily increased and may be anything from six months to one year. Hence the advantage of preprints as source of scientific information. In different subject fields of the biosciences, there already exist organized facilities for the exchange of preprints- some central agency, usually a leading research institution in the concerned field, has pre prints from scientists in all the participating institutions sent to it and circulates lists of preprints received, of which reprographic copies may be obtained by any scientist in the group on request. Where such a preprint service does not already exist for a particular speciality or research area, it should not be difficult to organize one if a sufficient number of laboratories are interested. Collaboration between India and other developed countries in such programmes of preprint exchange should go a long way towards keeping biomedical scientist abreast of the latest advances and trends of research in their area of specialization.

Last, but not the least, is the need for establishing close collaborative relations between information scientists catering to bioresearch in India and the other countries. The building up of collaborative relations between bio-information scientists in different countries will significantly help to raise the productivity of biological research in such countries, not only through the more rapid exchange of nascent information and ideas, but also through improvements in the methodology of information processing, storage and retrieval that would result from collaboration between information scientists of different countries in evolving newer techniques of information handling.

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GIANTS IN LIBRARY AND INFORMATION SCIENCE

A. R. CHAKRABORTY
Hyderabad.
B. Chakraborty
Calcutta.

An attempt has been made in this paper to identify the significant contributors in the field of Library and Information Science. Work cited in four different editions of the Handbook of Special Librarianship and Information Work, published by Aslib, have been considered as the base for this study. The name of S.R. Ranganathan tops the list of twentyfive names selected by analysing the data. Results obtained in this study have also been compared with a similar study made earlier.

1. INTRODUCTION

The structure of Information science has been built up on the foundation of Library science. The whole story of evolution of Information science from library science through the stages of 'Special Librarianship" and "Documentation" is the story of concentration, modification and addition of subjects. These changes and adjustments were inevitable in the environment of literature explosion, quick obsolescence of scientific literature, technological revolution and successful application of reprography, telecommunication and computer technologies in the communication of human knowledge. The formation of Aslib, changing of the name of the International Institute of Bibliography (IIB) to International Institute of Documentation (IID), renaming of American Documentation Institute (ADI) to American Society for Information Science (ASIS) are some of the landmarks in the not so long history of this evolution. Luckily for us, we need not go through the ordeal of strenous voyage by the Beagle to the Galapagos islands to study this evolution but can observe the document specimens in the library to ascertain this transition.

Sir Issac Newton, a great name in science, humbly submitted "If I have seen anything further that is by standing on the shoulders of giants", so giants in any field attract equal attention from tall men and pygmies in their field for different reasons - to "see further" and to know "how far has been seen" in their subjects. This importance of identifying giants in any field has inspired us to undertake the study of identifying giants in Library and Information science.

2. METHODOLOGY

A study was made by Cuadra [1] in the last decade to determine the key contributions in the field of Information science. Cuadra took the help of some bibliographies in the field and selected the top contributors by counting the "publication score". This score was calculated by multiplying the number of citations of individuals in the bibliographies covered for this study. An almost similar method has been adopted here with a different source. Editions first to fourth of the Handbook of Special Librarianship and Information Work, published by Aslib, London have been taken here as the core document for the present study. As this publication from an organisation of repute contains review articles on different aspects of Library and Information science, followed by long lists of citations, we may consider that contributions of significant importance only have been selected as citations. All the citations appearing in four different editions of the publication have been noted and the names of the authors arranged in the order of "publication score". This score for any author has been finalised according to the following formula.

$$\text{Score} = x_1 . x_2 . x_3 . x_4 + n$$

Where x_1, x_2, x_3, x_4, represent the numbers, the author has been cited in first, second, third and fourth editions respectively of the Handbook and n indicates the number, in how many editions the author has been cited. Thus value of n is restricted here between 1 to 4. In case the author has not been cited in a particular edition, say third, the value of x_3 has not been considered as zero but has been simply ignored in the score formula. This was necessary as the result of multiplication by zero will be zero and will lead us to an ambiguous result. Thus score of any author, cited twice in the first edition, thrice in the second edition, five times in the third edition and six times in the fourth edition is calculated in the following manner:

Value of $x_1 = 2$

$x_2 = 3$

$x_3 = 5$

$x_4 = 6$

As the values of x_1, x_2, x_3 and x_4 are available and none of them is equal to zero, so value of n is considered here as 4.

$$\text{So, score in this case} = x_1 . x_2 . x_3 . x_4 + n = 2 . 3 . 5 . 6 . + 4 = 184$$

Similarly score of another author, cited thrice in the first edition, twice in the third edition and not cited in other editions is calculated as follows:

$x_1 = 3$

$x_2 = 0$ (ignored)

$x_3 = 2$

$x_4 = 0$ (ignored)

As the non-zero value is available here in two cases only value of n, in this case, is considered as 2.

$$\text{So the score will be} = x_1 . x_3 + n = 3 . 2 + 2 = 8$$

Use of "n" in the formula was necessary to differentiate in many cases otherwise having equivalent scores. If "n" is dropped from the formula the scores of two authors, one cited four times in first edition only and the other cited four times in first edition and once each in all the other editions will have the same score as 4. But use of "n" will differentiate the scores in the two cases and will give different results as 5 (= 4 + 1) and 8 (= 4. 1. 1. 1 + 4) respectively for the first and the second author.

3. ANALYSIS OF DATA

After arranging all the cited authors according to the order of their "scores" the top twenty five names have been selected and presented in Table I.

TABLE - I

Giants in Library & Information Science

Sl. No.	Name of contributors arranged in order of citation score	Number of citations available in				Value of n	Citation score $= x_1 . x_2 . x_3 . x_4 + n$
		1st ed x_1	2nd ed x_2	3rd ed x_3	4th ed x_4		
1.	Ranganathan S R	16	18	16	5	4	23044
2.	Vickery B C	3	13	12	9	4	4216
3.	Foskett D J	3	8	10	8	4	1924
4.	Bliss H E	8	7	6	5	4	1684
5.	Holmstrom J. E	11	9	5	-	3	498
6.	Bradford S C	9	10	3	-	3	273
7.	Tauber M F	6	6	6	-	3	219
8.	Mills J	2	5	9	2	4	184
9.	Frank O	5	6	5	-	3	153
10.	Collison R L	5	6	5	-	3	153
11.	Crane E J	5	4	3	2	4	125
12.	Farradane J E L	4	6	4	-	3	99
13.	Jolley L	4	5	4	-	3	83
14.	Donker Duyvis F	6	6	2	-	3	75
15.	Urquahart D J	4	2	4	2	4	68
16.	Luhn H P	-	2	8	4	3	67
17.	De Grolier E	2	3	5	2	4	64
18.	Shaw R R	3	4	5	-	3	63
19.	Pollard A F C	5	4	3	-	3	63
20.	Wright J E	-	4	2	7	3	59
21.	Boggs S W	3	3	3	2	4	58
22.	Sayers W C B	3	3	3	2	4	58
23.	Coates E J	-	5	5	2	3	53
24.	Perry J W	3	4	4	-	3	51
25.	Taube M	4	4	3	-	3	51

We are happy to see the name of S.R. Ranganathan at the top of the list, particularly when the study covers a long span of decades. A comparative picture, showing the names selected in the previous and present study, is given in Table II.

TABLE II

Comparative Ranking of Library and Information Scientists

Ranking Order	Data from Cuadra's Study	Data from this Study
1	Kent	Ranganathan
2	Taube	Vickery
3	Perry	Foskett
4	Luhn	Bliss
5	Shera	Holmstrom
6	Vickery	Bradford
7	Mooers	Tauber
8	Ranganathan	Mills
9	Opler	Frank
10	Bernier	Collison
11	Sehultz	Crane
12	Shaw	Farradane
13	Bar-Hillel	Jolley
14	Hyslop	Donker Duyvis
15	Gull	Urquahart
16	Dyson	Luhn
17	Bourne	De Grolier
18	O'Connor	Shaw
19	Newman	Pollard
20	Frome	Wright
21	Garfield	Boggs
22	Yngve	Sayers
23	Clapp	Coates
24	Fairthorne	Perry
25	Andrews	Taube

Out of the twenty five names selected in the two lists, only the following six names, arranged in alphabetic order, are common:

Luhn
Perry
Ranganathan
Shaw
Taube
Vickery

While the previous study was made on contributions of a specific period, the span of time of the present study is much wider, covering the period 1955-75, through which the four different editions of the Handbook were published. With the change of time impact of contributions on a field varies, so it is no wonder that common names in the two lists are so less in numbers. Due to long span of time considered here, some of the eminent contributors of present times, were not cited sufficiently to be included in the selected list. It is agreed that if separate lists were compiled for different decades, many names, not available in this list would have figured and some of the names selected here might not have found a place in the list. Surely, persons of prominence of a specific time are not the same for a different time and a different era. However, the name of S.R. Ranganathan appears in the other list also. Although ranking is different from the present study, but he has been placed there in a fairly high position.

4. CONCLUSION

Analysis of citations for this type of study is not a new thing in spite of its known limitations. Selection of citations by the citing author may reflect his bias, may depend on non-availability of documents and language barrier. The list thus obtained may not be complete one. Other names may come up if the study is based on a different source. So, if this is not a complete picture even then it is a good side-view. We agree that there are other prominent contributors in the field but simultaneously we believe that nobody will question the height of the giants listed in the paper.

5. REFERENCE

[1] Cuadra C A: Identifying key contributions to Information Science. Amer Doc. 15(4), 1964, 289-95.

STUDIES OF CHEMICAL LITERATURE AND CHANGES IN THE RANKING OF PERIODICALS BY CITATION ANALYSIS OF DATA FOR 1967-76

MOHINDER SINGH
Regional Research Laboratory
Bhubaneswar-751013 (Orissa).

The paper embodies the studies of chemical literature from many angles, such as, subject-wise and countrywise dispersion of papers, dispersion of periodical and non-periodical publications, countrywise dispersion of patents, during the ten-year period (1967-1976) as cited in the most significant review journal the Chemical Reviews. The change in the ranking of periodicals from 1967 to 1976 is also studied. On the basis of this study, some important analysis have been made.

1 INTRODUCTION

In a short span of time, literature in no other subject field has grown so much as in Chemistry. If we go a little back then it is found that till the beginning of 19th century, the field of chemistry, as such, was far away from the age of fragmentation and specialisation. There were only a counted few number of journals, mostly published from Germany, France, England and USA According to a rough estimate, there were only about 300 pages of journal articles on chemistry during 1879, which is equivalent to the present issue of the Journal of the American Chemical Society*. Since during that period, chemistry was in the developing stage, so there were only limited number of books published on the subject. But today, the situation is different. Tremendous progress made in the field of chemistry during the 20th century has created overwhelming mass of literature. The number of periodicals increased awfully In 1910, there were only about 435 periodicals abstracted in the Chemical Abstracts, but now the number of periodicals abstracted has increased to over 14000. Besides its traditional classes, there are now more than 100 branches and sub-branches in chemistry. Lakhs of books and monographs on chemistry are published every year throughout the world. On the basis of the present output of scientific literature, it is estimated that the growth of chemical literature has gone to such an extent that it alone is now constituting nearly one-fourth of the total growth of scientific literature.

When such is the growth rate, obviously, it becomes not only necessary but essential to study the various categories of chemical literature which is cited quite often in the research papers. The method of citation counting, which was first described by Gross and Gross [1] and developed later on by Garfield [2, 3] is an important tool for such type of studies. The method of citation analysis is based on the citation countings of lists, reviews or guides of most cited literature. For this study the Chemical Reviews (CR), a review journal which is most important and highly reputed in the chemical research community is taken as the source document.

2 AIM OF STUDY

The aim of this study is two-fold: (i) To reveal, analyse and discuss from many angles the nature of chemical literature, including books and monographs, theses and dissertations, reports, patents, proceedings of conferences, symposia, seminars, etc., as cited in the Chemical Reviews during the ten-year period (1967-76). (ii) To prepare, in order of ranking, a list of chemical periodicals and examine the changes in their ranking from 1967 to 1976.

3 SCOPE AND LIMITATIONS

The study has the following scope and limitations: (i) It is confined to the examination of chemical literature, including periodicals, books and monographs, theses and dissertations, reports, proceedings of conferences, seminars and symposia etc. (broadly classed as Periodical and Non-Periodical publications) taking Chemical Reviews, 1967-76, as the source journal. (ii) The ranking of periodicals in Chemistry and their further changing of relative ranking positions from 1967 to 1976 has also been done on the basis of citations as found in the Chemical Reviews. (iii) Though, the number of journals scanned was about 600, but while preparing the final ranking list, only those 100 journals are taken into account whose total citations in the year 1967 and 1976 came out to be more than 15. This is done just to avoid making the list of journals unduly lenghty. (iv) Titles of journals cited in the Chemical Reviews have been given in abbreviated form as per Chemical Abstracts practice in the ranked list. (v) Lastly, the ranked list of journals as prepared here, may not be considered as definitive and permanent for ever, rather the utility and hence the relative ranking position of journals may change, as seen in this study, with the passage of time.

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* Journal of the American Chemical Society, started in 1879, is now published semi-monthly.

4 USEFULNESS

This study bears the following uses (i) It provides a quantitative study of various categories of chemical literature as recorded in the Chemical Reviews from 1967-1976. (ii) It embodies a list of important journals which are used most frequently by the chemists. (iii) The ranked list prepared here should be of some help to the librarians in the selection of most useful periodicals in the field of Chemistry, in formulating their library budgets or revision of their acquisition policy, and in identifying the relative value of periodicals in the field. (iv) By correlating citation frequency with other factors like cost of journals, re-appearance of cited items, etc, important results like basis for cost-benefit analysis in the management of subscription budgets, impact factor (average citation rate per published item), important reading list of journals, etc, may be derived.

5 METHODOLOGY

The method of citation counting has been followed for the analysis of chemical literature. In order to carry out a systematic study, the publications are first broadly divided into Periodical and Non-Periodical publications. All publications, like books and monographs, theses and dissertations, reports, adhoc publications like proceedings of conferences, symposia, seminars, etc, personal/private communications, or unpublished data are treated as non-periodical publications. Other regular publications, such as periodicals, proceedings or transactions of permanent organisations are treated as periodical publications. All reference citations given at the end or in the footnotes are taken into account. Simple plain paper was used to note citations of non-periodical publications. For noting periodical publications 5" x 8" cards were used. A specimen of the card with the entries is given at the end.

51 Specimen Card

In the top horizontal column, the name of the periodical (Acta Chemical Scandinavica) cited in the Chemical Reviews of the years mentioned was noted. Separate horizontal columns were made for the years 1967 and 1976. Then these horizontal columns indicating years of study have been divided into ten vertical columns to note period-wise, as shown, the number of citations of the journal as found in the Chemical Reviews. Thus, in the first vertical column, citations and journals published prior to 1901, in second 1901-20 were noted, and so on. Overall ranking of the journal was made on the basis of the grand total of citations.

6 RESULTS, ANALYSIS AND DISCUSSION

The results of scanning the source journal are presented in various tables, which may be analysed and discussed as follows:

Table 1 provides the subject-wise analysis of review articles, giving some idea about the relative importance of the traditional branches of chemistry. As seen, on an average, about 26 new review papers on various branches of chemistry were published every year. On analysing subject-wise it is found that, though the journal is unbiased to any branch of chemistry, but a great number of review papers belong to the areas of Organic and Physical Chemistry and relatively very few are devoted to Inorganic Chemistry. From the Table, it is also revealed that some of the papers are inter-disciplinary in character, touching other areas of sciences. Table 2 provides country-wise distribution of review papers during the ten year period. From this Table it is revealed that Chemical Reviews includes review articles from all over the world, but most of the contributors belong to USA and UK. From this observation, it may also be concluded with some exception, that most of the top developments in chemistry are taking place in USA, relatively less in UK and some in other countries.

Table 3 records the frequency of citations of periodical and non-periodical publications. As chemical literature is growing rapidly, as seen, the references cited, except in the years 1971 and 1972, are increasing continuously from 1967 to 1976. When citations were analysed further, it is found that, periodical and non-periodical publications including patents constitute about 85% and 15% respectively of the total cited literature. This reveals the relative importance and trends of citations of periodical and non-periodical publications. Table 4, which is closely related to Table 3, presents the frequency of citations of non-periodical publications including books and monographs, theses and dissertations, proceedings of conferences, symposia, seminars, and reports etc. It is noticed that with the fast growing rate of periodical literature, this type of literature is also growing with a similar speed, adding considerable amount of basic knowledge to the existing volume of knowledge. On further analysis of citations it is also seen that among non-periodical literature, publications like monographs, theses and reports are cited more frequently than any other type of non-periodical publications.

Patents also constitute an important part of chemical literature. Table 5 shows the country-wise distribution and frequency of citations of patents during the ten-year period (1967-1976). It is found that patents from USA, Britain, France, Germany, Belgium, Japan, Netherlands, USSR and Switzerland are cited more frequently, in the same descending order as mentioned, than from other countries. On further analysis, it is traced that the countries, Australia, Austria, Canada, Denmark, Holland, Hungary, Israel, Italy, Romania and South Africa are also adding significant amount of chemical patent literature. Year-wise distribution of patents reveals that patents were referred more often in the years 1967-68, 1970-1972, 1975 than in 1969, 1973-74, 1976. This gives some reflection about the kind of subjects reviewed during these years, as the growth of patents depends to a good extent on the growth of specialisations.

Table 6 presents the list of most frequently cited journals arranged in their descending rank order. In this study about 600 titles have been noted and out of them only the first 100 titles whose total citations during 1967 and 1976 are either 16 or more, are included in the list. In order to avoid making the list unnecessarily lengthy, rest of the journals i. e. 500 which have been referred to less than 16 times (i.e., less than 1% of the most frequently cited journal) during 1967 and 1976 have not been considered for ranking. The list of journals which is based on frequency of citations, being completely free from all biases, may prove a reliable and most useful source for the selection of important periodicals in the field of chemistry. The Table also presents the changes in the relative ranking positions of the journals from 1967 to 1976 or vice versa. While comparing the 1967 list with that of 1976 list, one finds that J. Am. Chem. Soc. and J. Chem. Soc. have retained their same top positions. Angew. Chem. Intern. Ed. Engl. improved its rank from 22 to 12, Chem. Commun. from 26 to 6, Indian J. Chem. from 95 to 54, Science from 85 to 51, and so on. While in case of some other journals, it happened otherwise, like Acta Chim. Acad. Sci. Hung. which came down from 58 to 87 position, Ann from 7 to 97, Ber from 20 to 47, Nature from 16 to 27, and so on. As the utility of a journal may change with the passage of time, as seen here, the ranked list must be reviewed and modified periodically in order to keep it as a useful selection guide. From this list, it is also examined that about 70% of the journals selected are published from USA, UK, USSR and Germany only. On analysis of list, it is also estimated that there are about 45% journals whose text is in English, about 30% whose text is multi-lingual most often in English, German, French and Russian, and about 25% whose text appears solely in languages other than English. While examining the journals' list it is also found that not only journals in the traditional main areas of chemistry like Inorganic Chemistry, Organic Chemistry, Physical Chemistry, but also other journals which cover more than one speciality like, Nature, Biochemistry J., J.Med. Chem., Biochem. Biophys. Acta, Physica and Science, etc. It is further revealed that more than 75% of the total chemical literature is covered only by the first 25 journals alone, which may be considered as the outstanding or preferentially highly cited journals in the field of Chemistry.

Finally, the results of this study may be considered in relation with the Bradford's law of scattering. Broadly speaking the Law states that the articles of special interest must occur not only in the periodicals specialising in that speciality, but also from time to time in other periodicals which grow in number due to loosening of relation with that special area. As a result of this, the number of articles on that special area in each periodical also diminishes. The ranked list, as shown in Table 6 reveals the truth of the Law. Most of the lowly ranked journals in the list are seen to be less and less related to Chemistry and the number of citations to them are also slowly reducing. The validity of the Law that most of the literature on a particular subject is covered by some of the core journals only, is also tested to a great extent by this study, due to the fact that more than 75% of the total citations is contributed by the first 25 journals in the ranked list.

ACKNOWLEDGEMENT

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[2] Garfield, E. Citation indexing for studying science. Nature, 1970, 227, 669-691.

[3] Garfield, E. Citation analysis as a tool in the journal evaluation. Science 1972, 178, 471-479.

ANNEXURE

TABLE 1: Subject-wise distribution of review papers per year

Year	Total No. Rev. Papers	Subject			
		Org. Chem.	Inorg. Chem.	Phys. Chem.	Others
1967	25	16	2	7	-
1968	23	10	3	9	1
1969	31	11	3	16	1
1970	25	13	1	5	6
1971	26	7	1	15	3
1972	25	9	6	8	2
1973	27	13	4	9	1
1974	25	10	2	10	3
1975	30	12	3	15	-
1976	27	14	5	3	5

TABLE 2: Country-wise distribution of review papers per year.

Year	Total No. of Rev. Papers	Contributors		
		USA	UK	Others
1967	25	15	7	3
1968	23	18	2	3
1969	31	15	10	6
1970	25	11	8	6
1971	26	14	4	8
1972	25	10	7	8
1973	27	15	3	9
1974	25	16	3	6
1975	30	13	5	12
1976	27	16	4	7

TABLE 3: Citations of periodical and non-periodical publications per year

Year	Total No. of References	Periodical Publications	Non-Periodical Publications
1967	6033	5040	993
1968	6260	5572	688
1969	7761	7044	717
1970	6484	5745	739
1971	5392	4754	638
1972	6358	5655	703
1973	6600	5993	607
1974	7277	6629	648
1975	7899	7033	866
1976	8087	7119	868

TABLE 4: Citations of non-periodical publications per year

Year	Books/ Monographs	Theses/ Disserts.	Reports	Proc. of Confs./ Symp/Semi. etc.	In Press/ To be Pub.	Misc.*
1967	209	26	43	24	21	32
1968	308	36	36	12	11	51
1969	276	50	99	34	15	70
1970	299	37	24	36	11	64
1971	221	26	28	12	16	81
1972	278	56	17	30	17	97
1973	242	58	28	42	4	64
1974	209	42	12	24	18	68
1975	359	42	25	44	25	62
1976	257	69	52	34	20	98

*Miscellaneous: Personal/Private Communications, incomplete references, Unpublished data, Data in preparation, work in progress etc.

TABLE 5: Citations of Patent publications per year

Country	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
1. Belgium	48	13	10	17	12	2	12	14	18	4
2. Britain	104	25	21	56	31	39	28	35	36	6
3. France	46	18	12	4	42	19	14	23	37	6
4. Germany	58	36	14	26	28	23	27	27	38	6
5. Japan	45	10	8	6	4	25	6	8	31	16
6. Netherlands	14	16	22	13	2	1	6	6	8	6
7. Switzerland	6	1	1	1	11	1	1	58	3	2
8. U.S.A.	251	102	71	129	122	88	69	60	84	41
9. U.S.S.R.	6	1	10	14	1	4	1	4	22	12
10. *Others	34	12	4	2	1	6	5	16	7	37

*Others: Austria, Australia, Canada, Czechoslovakia, Denmark, Holland, Hungary, Israel, Italy, Poland, Romania, South Africa, etc.

TABLE 6: Frequency of citations and changing relative ranking position of periodicals*

Rank No.	Abbreviated Title	Citations		Changes in Ranking	
		1967	1976	1967	1976
1	2	3	4	5	6
1.	J. Amer. Chem. Soc.	589	1380	1	1
2.	J. Chem. Soc.	337	734	2	2
3.	J. Org. Chem.	281	370	3	4
4.	Tetrahedron Letts.	84	487	8	3
5.	J. Chem. Phys.	233	225	4	7
6.	Chem. Ber.	196	162	5	10
7.	Tetrahedron	55	234	14	5
8.	Chem. Commun.	30	226	26	6
9.	J. Phys. Chem.	80	172	9	9
10.	J. Organometal Chem.	8	223	70	8
11.	Zh. Obsch. Khim.	160	56	6	20
12.	Bull. Chim.Soc. France	52	154	17	11
13.	Angew. Chem. Intern. Ed. Engl.	38	154	22	12
14.	Can. J. Chem.	51	132	19	14
15.	Helv. Chim. Acta	28	142	31	13
16.	Inorg. Chem.	52	106	18	15
17.	Bull. Chem. Soc. Japan	35	98	24	16
18.	Chemical Ind. (London)	75	54	10	21
19.	Angew Chem.	62	52	13	22
20.	Ann.	110	2	7	97
21.	Dokl. Akad. Nauk. USSR	73	32	11	36
22.	Trans. Faraday Soc.	55	48	15	24
23.	J. Biol. Chem.	73	28	12	41
24.	Nature	53	46	16	27
25.	Recl. Trav. Chim. Pays-Bas.	25	64	32	18
26.	Z. Anorg. Allg. Chem.	12	76	56	17
27.	Z. Physik Chem.	30	50	27	23
28.	J. Inorg. Nucl. Chem.	29	48	29	25
29.	Z. Naturforsch.	35	40	25	31
30.	J. Heterocyclic Chem.	7	64	77	19
31.	Chem. Pharm. Bull.	30	40	28	32
32.	Ber.	45	22	20	47
33.	Biochemistry J.	16	44	47	29
34.	Australian J. Chem.	12	46	57	28
35.	J. Med. Chem.	8	48	71	26
36.	Proc. Chem. Soc.	42	12	21	73
37.	Collect. Czech. Chem. Commun.	23	28	34	41
38.	Izv. Akad. Nauk. SSSR. Otd. Khim. Nauk	38	12	23	74
39.	Mol. Phys.	14	36	51	35
40.	J. Prakt. Chem.	23	26	35	46
41.	Phytochemistry	2	44	91	30
42.	Proc. Roy. Soc. (London)	17	28	42	44
43.	Gazz. Chim. Ital.	20	24	37	45
44.	Acta Chem. Scand.	24	18	33	58
45.	Acta Crystallogr. (A&B)	2	40	92	33
46.	J. Polymer Sci.	10	32	65	37
47.	Pure Appl. Chem.	2	40	93	34
48.	Zh. Fiz Khim.	18	22	42	48
49.	Bull. Soc. Chim. Belges.	29	10	30	78
50.	Anal. Chem.	19	18	40	59
51.	Biochem. Pharmacol	40	30	86	39
52.	J. Pharm. Pharmacol.	2	32	94	38
53.	Izv. Akad Nauk. SSSR. Ser Khim	20	12	38	75
54.	J. Chromatogr.	6	26	80	44

Number of citations against some of the above periodicals appear to have been scattered due to changed titles of the same periodicals or different abbreviations of the same periodicals, e.g., Ann. and Ann. Chem. or Ber. and Chem Ber. - Ed.

1	2	3	4	5	6
55.	Experientia	5	24	84	46
56.	J. Mol. Spectrosc.	8	20	72	53
57.	Proc. Nat. Acad. Sci. US	10	18	66	60
58.	Zh. Neorgan Khim.	6	22	81	49
59.	Biochim. Biophys. Acta	19	7	41	86
60.	Chimia	4	22	87	50
61.	Science	5	21	85	51
62.	Spectrochim Acta	14	12	52	76
63.	Discussions Faraday Soc.	21	4	36	95
64.	J. Pharm. Soc. Japan	11	14	63	69
65.	Naturwissenschften	15	10	50	79
66.	Naturwissenschaften	14	10	53	80
67.	Zh. Org. Khim.	6	18	82	61
68.	J. Indian Chem. Soc.	3	20	90	55
69.	Z. Electrochem	17	6	45	89
70.	Zh. Strukt. Khim.	17	6	46	90
71.	Ber. Bunsenges Physik Chem.	12	10	62	81
72.	Indian J. Chem.	2	20	95	54
73.	J. Chem. Educ.	8	14	73	65
74.	J. Chem. Engg. Data	2	20	97	52
75.	J. Electrochem. Soc.	12	10	61	77
76.	Monatsh Chem.	8	14	74	66
77.	Opt. i Spektroskopiya	18	4	43	93
78.	Proc. Phys. Soc. (London)	20	2	39	98
79.	Yakugaku Zasshi	4	18	88	56
80.	Biochem. Biophys. Res. Commn.	9	12	69	70
81.	J. Opt. Soc. Am.	8	12	75	71
82.	J. Sci. Ind. Res. (India)	4	16	89	62
83.	Makromol. Chem.	6	14	83	67
84.	Chim. Ind. (Milan)	7	12	78	72
85.	Roczniki Chem.	11	8	64	83
86.	Z. Chem.	1	18	100	57
87.	Acta Chim. Acad. Sci. Hung.	12	6	58	87
88.	Electrochim. Acta	16	2	48	99
89.	J. Phy. Chem. Solids	10	2	49	100
90.	Physica	10	8	67	84
91.	Curr. Sci. (India)	2	15	98	63
92.	J. Med. Pharm. Chem.	13	4	54	94
93.	Life Sci.	2	15	99	64
94.	Biochemistry	8	9	79	82
95.	Arch Biochem. Biophy.	12	5	59	91
96.	Phys Status Solidi	12	5	60	92
97.	J. Chim. Phys.	8	8	76	85
98.	J. Less Common Metals	2	14	96	68
99.	Chemical Engg. News	13	3	55	96
100.	Philos. Mag.	10	6	86	88

SPECIMEN CARD

Acta Chemica Scandinavica										
Year	Prior to 1901	1901-20	1921-40	1941-50	1951-55	1956-60	1961-65	1966-70	1970-73	1974-76
1967										
1976										

MEETING THE INFORMATION NEEDS OF RESEARCH SCIENTISTS - A SAMPLE ANALYSIS OF INSDOC DOCUMENT SUPPLY SERVICES

R.S.YADAV and Mrs. ARUNA KARANJAI
INSDOC, New Delhi-110012

Presents an analysis of a sample of requests for copies of sci-tech documents received at Insdoc. Discusses the relevant points pertaining to the operation of the service & the overall efficiency required for meeting the need of scientists for various types of documents. Throws some light on the self-sufficiency achieved & the functioning of various information services in India.

1. Introduction

Supply of copies of documents is being increasingly considered an important documentation service. In some countries the service is being provided at the national level. From its inception, Insdoc has been serving as the principal agency in the country for providing scientists with copies of scientific and technical documents for research use. The use made of document supply service has been conceived [1, 2] like other indicators as an important determinant for assessing the extent of literature use.

2. Objectives of the Study

This paper presents an analysis of a sample of requests for copies of scientific and technical documents received at Insdoc and is some what on the line of earlier reported papers [3, 4]. It also discusses the relevant points relating to the operation of the service and the over all efficiency required for meeting the need of research scientists for various types of documents. This also attempts to throw light on the self-sufficiency achieved and functioning of information services in India and the relative cooperation shown by various scientific and technical libraries and information centres and also points out its impact on NISSAT.

3. Parameters of the Study

1. The requests for Insdoc services have been chosen as the source of data.

2. The sources of information and types of documents have been categorized in the sense of the terms defined in the Librarian's glossary [5].

3. Publications of national and international congresses issued at regular intervals have been considered as serials whereas such publications brought out irregularly have been considered as conference papers.

4. In making the time analysis, which was however possible only for serial publications, conference papers and theses, wherever the year was not mentioned by the customer in his request; the same was obtained from various union catalogues and lists available in Insdoc's Union Catalogue Section.

5. The abbreviations for libraries and information centres cooperating in interloan/or reprographic service are those used in Document. Procurement Division of Insdoc and have been listed in full in the appendix.

6. The delay as well as success rate in supplying the orders was measured from the date the request was received to the time the copy of the document was despatched to the customer.

7. The orders received during the months of February and March 1974 which represent 24.6% of the total requisition during the fiscal year 1973-74 were chosen for analysis.

8. The orders have been grouped according to the complexity of the reference and their availability and have been detailed as below:

a) Ill-considered orders: These consisted of requests which turned out to be either cases of wrong citations or requests from book and similar copyrighted materials e.g. entire issue of a journal. This category also included requests cancelled by the customers themselves and other requests which were not live at the time of making the analysis. In some cases certain clarifications were sought from the customers but without any response.

b) Unexecuted orders: Unexecuted orders mean the requests which stood unexecuted at the time of making the analysis i.e., 31st April, 1975 either due to procedural limitations e.g., advancing money to Indian and Foreign centers while placing orders, the cost demanded by us e.g., for undertaking translation and financial constraints i.e. lack of foreign exchange with us, or under the hope that these are likely to be processed in due course.

c) Non-available orders: This category means in addition to the characteristics pointed out above that some of the centres have been tried and the others could not be tried due to paucity of foreign exchange and the cutomers having been informed accordingly.

4. Methodology

The study has been carried out within the traditional and accepted framework of case study method. The data were collected on appropriately designed proforma.

The results have been tabulated to bring the objectives in view.

5. Analysis

Altogether 3834 orders for microfilms/slides/paper photocopy/translation of scientific and technical documents from various types of publications, were received during the months of February and March 1974. This included 138 orders where the customers had supplied the original documents. In other words the number of orders against which documents were to be procured (excluding the documents supplied by customers) was 3696. Out of this as many as 120 orders were ill-considered. Out of the remaining 3576 only 2972 orders were supplied till 31st April 1975 and 604 requests remained unexecuted or non-available.

6. Types of requests

The orders have been broken down by the types of publications requested alongwith age distribution (where ever possible), by the libraries and information centres contacted for getting copies of the documents, and also by the success rate of sending the document copies to the clientele.

Requisition for serials alone formed 93.2% of the total of 3696 orders (excluding 138 from enclosed documents) as shown in Table I.

The percentage for other types of documents, namely, conference papers, patents, technical reports, standard and specification, and theses and dissertations is respectively 2.1, 2.1, 1.2, 0.3 and 0.2. This shows that scientists consult serials as source of scientific information more frequently than any other source of information. However, in the findings actual ratio for various types of documents would have been a little different if we could get sufficient foreign exchange, lack of which resulted in the non-fulfillment of requests for some specialized material.

7. Age Distribution of Literature

In judging the recency or otherwise of the documents requested, wherever possible, the data were broken down decadewise as given in Table I-3. It can be seen that 90.8% of the requests were pertaining to documents published during and after 1940. The individual ratio being 19.5% for 70's, 41.5% for 60's and 22.2% for 50's and 7.7% for 40's and so on which reveals that current research is based on recent findings and the literature published during earlier periods is of little use. It is worth pointing out that BLLD reports indicate that 63% of the requests received were for literature published during the last one decade. Our findings indicate that requests for articles in serials, conference papers and theses published during the last 13 years account for nearly 61%, which is very near to the BLLD findings.

8. Cooperating Libraries and Information Centres

For meeting the needs of research scientists for copies of scientific documents, Insdoc draws on the resources available in the National Science Library, libraries of CSIR laboratories, other libraries in Delhi region, namely, Indian Agricultural Research Institute, National Medical Library and other medical libraries, Indian Standards Institution, Indian Institute of Technology, Delhi University Library, Indian National Science Academy and a large number of libraries in other parts of the country. As a last resort copies of non-available references are obtained in microfilms/Xerox form from foreign libraries and documentation centres by air mail and supplied to the customers. The percentage of demand fullfilled from Indian libraries and foregin centres have been shown in Table 3. It can be seen that 61.13% of the total requests were fullfilled from resources available in the country and 21.98% from foreign centres and the remaining 16.89% were still being tried or customers were informed about their non-availability. The degree of cooperation and response shown to our work vary from library to library and consequently the execution time range from a few weeks to months together.

91 Supply Speed and Time Lag

Out of the total 3834 orders 120 were ill-considered orders and among the rest of 3714 of valid requisitions as many as 377 (10.505%) were supplied within four weeks time or within a month, the same month and as many as 1476 (39.74%) after more than one month's time, 2020 (54.38%) at the end of two months time and 2257 (60.77%) at the end of three months time and so on as shown in Table No.4.

About 12.33% of the requsitions were still being processed at the end of 52 weeks time in the hope of satisfying them at later date or as soon as the foreign exchange was made available. Nearly 4.55% of the requisitions were cancelled since the other alternative source could not be tried again due to resons given above.

92 Gaps in Existing Resources

It can be seen from the Table 5 that our resources are far from satisfactory in respect of such specialized material as patents, technical reports, conference papers and theses and dissertations for which nearly 2/3 requisitions (60.85%) lay unexecuted. However the situation in case of standard and specifications was found quite

TABLE 1: Percentage breakdown for various types of information sources

Decades	Serials	Conference papers	Theses & dissertation	Books	Patents A	Patents B	Standard Specification	Technical Reports
70's	672 (10)	17	3	x	US Br	43 12		
60's	137 (17)	37	6	3	Ger Jap	7 5	12	
50's	756	21			Fr USSR	4 4		
40's	268	1			Indian	1		
30's	168	2			Other	1		
20's	87	1						
	107	x						
G. total:	3445(93. 209)	79(2. 083)	9(0. 243)	4		77(2. 083)	12(0. 324)	70(1. 893)

TABLE 1-B

Decade / Type	70's	60's	50's	40's	30's	20's	Before 20's	Grand Total
Serials	672	1387	756	268	168	87	107	3416
Conf. Papers	17	62	21	1	2	1	-	79
Dissertation	3	6	--	-	-	-	-	9
GT in %	692 (19.47)	1455 (41.52)	777 (22.17)	269 (7.67)	170	88	107	3504
			90.846%					

TABLE 3. Number of requisitions supplied by collaborating Libraries & Information Centres.

Time Lag	NSL	IARI	NML, ISI Delhi Lib.	Other Libraries in India	BLLD	CNRS	Viniti	National Library of Medicine	National Diet Library	Hungary	Other foreign libraries	Total	Unfulfilled requests
1	2	3	4	2	6	7	8	9	10	11	12	13	14
At the end of same month	251	2	8	2	-	-	-	25	-	2	-	290	
1	401	306	254	16	8	49	-	29	-	4	5	1072	
2	140	122	121	18	2	114	1	4	7	-	12	541	
3	61	28	44	24	7	28	1	9	17	-	7	226	
4	13	19	27	55	16	34	19	8	26	-	8	225	
5	12	5	8	28	13	23	4	13	6	-	6	118	
6	7	2	2	33	27	13	2	2	-	-	8	96	
7	3	-	-	20	15	-	5	3	-	-	-	46	
8	-	-	3	16	53	5	1	1	2	7	-	88	
9	1	-	4	24	33	5	-	1	-	-	5	73	
10-13	-	1	10	95	58	14	-	1	-	13	5	292	604
G. Total: & %	889 (24.86)	485 (13.56)	481 (13.4)	331	232	285	33	96	58	26	56	3576	604

61.13% 21.98% 16.89%

83.11% (604)

satisfactory. Hence the plans should be drawn up to become self sufficient in national resources with priority emphasis on specialized literature.

TABLE NO. 4: Supply Speed

Months end	No	Progressive Total (3714)	%
Same	377(87)	377	10.505
1	1099(27)	1476	39.741
2	544(3)	2020	54.388
3	237(11)	2257	60.770
4	228(3)	2485	66.90
5	121(3)	2606	70.16
6	98(2)	(103) 2913	78.43
7	48(2)		
8	88		
9	73		
10-13	197	3110	83.73
Unfulfilled	604	3714	
Grand Total		3714	

Note: Figures within parenthesis indicate the number of requsitions sent for document supply service with material enclosed.

93 Second and Subsequent Locations and Delay

It is found that all the requisitions are not fulfilled at the first attempt as the material may not be available readily. Requisitions may be turned down by collaborating libraries on account of publications not on shelf, publications issued out, too many pages to copy, loose issues not available on loan and so on. In this way out of 2972 requisitions and nearly 230 (7.73%) of the cases, the locations were tried second and subsequent times. The requisition tried for location 3rd time numbered 75 and similarly for fourth and subsequent times numbered 21. The worst part of this is that in some cases information regarding non-availability is received very late, if not reminded or followed up, which consequently affects the speed adversely.

94 Conclusions

Our science libraries are by and large becoming self-sufficient in serial literature as the percentage of unfulfilled requisitions is only 13.38%, but the situation so far as patents, conference papers, dissertations and technical report literature is concerned is still very unsatisfactory (failure rate being of the order of 60.85%). For such literature we continue to depend on foreign sources. As regards standards and specifications, the library of the Indian Standards Institution, Delhi is in a position to satisfy and offer full range of standards information services. As regards report literature though Bhabha Atomic Research Centre and National Aeronautical Laboratory have massive collections but they are primarily in the field of nuclear and aeronautical sciences and for other types of reports we are still dependent on foreign sources.

The delay or waiting time range from few weeks to several months and only 70.16% of the requisitions get fullfield at the end of 5 months. The delay can be attributed to lack of library cooperation, absence of a truly national information system, lack of up-to-date location tools, and lack of adequate foreign exchange release, besides the lack of necessary manpower and consequent difficulty in proper follow up action.

TABLE 5. Unfullfilled requisitions

Serials	Theses	Technical Reports	Conference Papers	Patents	Standards & Specifications	GT	Books
Total Requsitions	9	70	70	77	12	3692	4
3445		235					
Unfullfilled	5	51	45	42	Nil	604	4
461		143					
% 13.381		60.851				3692	36%

95 Suggestion

On the basis of the above analysis it is suggested that the proposed library and information centre of patent office, at Calcutta or elsewhere should undertake documents supply service as one of its main functions.

Our science libraries should give due attention to the organisation of conference proceedings, dissertation and technical report literature, besides serial literature, preferably by maintaining separate sequence entries in their catalogues. A union catalogue of such specialized collections would be very useful, if compiled.

There is an immediate need of updating the Union Catalogue series of Insdoc at regular intervals.

The Documents Supply Service Division should be equipped with up-to-date tools required for drawing on the resources of foreign documentation centres and libraries and must get necessary foreign exchange release since Unesco Coupons are no longer available for procuring copies of documents from abroad.

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AEROSPACE INFORMATION SYSTEM IN INDIA: A PROPOSED PLAN

S.K. TANEJA
Aeronautical Development Establishment, High Grounds, Bangalore-560001

A plan for Aerospace Information System (AIS) to cater to the information requirements of the scientists/engineers engaged in design, development and production pertaining to aeronautics and space sciences in India has been proposed. Design and operation of AIS alongwith its technical services have also been discussed.

Upto-date factual information in aeronautics, space sciences and their related disciplines is most essential for design, research and development work. Though there is plenty of information available, there is lack of a structured system for handling it. A plan for an information system to cover the vital areas such as aeronautics and space is proposed in this paper. We have to be very cautious in designing such an information system which should be commensurate with the demonstrated and the anticipated information requirements of the scientific and technical community associated with aerospace. Aeroscape information system discussed in the present paper should cater to the information requirements of the scientists and engineers working in the organisations pertaining to aerospace, through their active participation in the proposed Aerospace Information System (AIS). Some of these organisations are ADE, GTRE, NAL, HAL, IISO, ISRO etc. and various other institutions conducting courses in aeronautics and space sciences in India.

Before going into the details of the suggested AIS, it will be proper to explain some of the basic concepts that are involved in the proposal.

What is an Information System

An information system consists of data base which is collection of records properly indexed to suit the user requirements and stored in the machine readable form for providing information services to a given user community. Unlike an ordinary file system, an information system is not generally designed for a single identifiable purpose. Instead it may be used for a variety of quite different purposes for a large user group located at distances from the central information file. Normally, computer programmes are required for querying the data base, retrieval of information, printing the output against a search query, and performing other necessary tasks to permit the optimum utilisation of the stored information files.

Types of Information Systems

There are mainly two types of information systems viz., (1) Data providing system (DPS); and (2) Reference providing system (RPS).

DPS responds to specific requests for data with specific answers, as far as possible, only the data actually requested. RPS serves users that may not be concerned with specific facts, but might be interested in a state of the art reports for a specific subject area. Output of this sytem normally consists of a set of relevant references followed by the concerned documents.

Although the two information systems are related in the sense that the answers sought from a DPS might be found in the document sets retrieved by a RPS, but the information storage organisation and processing steps necessary to carry out the various operations are quite different for the data and reference providing services.

The proposed Aerospace Information System is a Reference providing system.

Purpose

Aerospace information system through familiarity with information services will cater to the information needs of the scientists and engineers and promote the information conciousness among the users. Services rendered by this system would also be to some extent beneficial to scientists working in other disciplines as well. Commensurate with the increasing tempo of research, design and development activity in aeronautics, and space AIS needs to be organised to effectively collect, collate and disseminate scientific information to research scientists, top management and other users of information concerning aeronautics and space.

The main objectives of the proposed AIS will be:

i) To provide the documentation/information service to the participating organisations engaged in research, design and development activities in aeronautics and space;

ii) To function as a clearing house for information on all aspects of aeronautics and space; and

iii) To collaborate in the integrated development of various documentation/information sub-systems in the field of aeronautics, space and related disciplines in the country as a whole and function as a feeder to international systems such as ESRIN/RECON of European Space Agency at Frascati near Rome

The Organisation of AIS

Any future system will have to be built upon the existing infrastructure, in the areas of aeronautics, space and related disciplines, however, inadequate these may be. Three major components of this system are:

i) Libraries attached to colleges and institutions conducting various courses in aeronautics and space, R&D institutions such as ADE, GTRE, NAL, IISc, ISRO and public sector industry such as HAL.

ii) Information contained in the published literature, viz., books, periodicals, technical reports, standards and specifications, reprints, dissertations etc., originating both from within the country and abroad.

iii) Users or clientele made up of engineers, research workers, teachers, planners and administrators etc., associated with aerospace fields.

AIS will be organised as a large central facility at one of the participating organisations with the required facilities and expertise at other participating establishments in the system. The present plan aims essentially in establishing the central facility and gives only guidelines for the organisation of the local information facilities at various participating information centres. The central facility will consist of the following functional units:

i) Document acquisition and processing;

ii) Documentation/Information services and facilities;

iii) Promotion of information use by increasing information consciousness and maintaining the 'awareness level' of scientists;

iv) Translation services;

v) Reprography, printing and publications for dissemination of information;

vi) Computer facilities to handle such a vast amount of aerospace information which if handled manually may be difficult to cope with the proliferating literature; and

vii) Secretariat.

Translation and Reprographic Facilities

AIS would be acquiring publications in foreign languages besides English, in keeping with its acquisition policy and therefore proper translation facilities are necessary. In addition to the translators available from the participating organisations, a panel of translators will have to be maintained and augmented from the panels drawn up by INSDOC, DESIDOC, etc. Moreover AIS would maintain bibliographical details of any translation done elsewhere in India to avoid any duplication of translation which is already too expensive. Interested person after obtaining the information concerning availability of a translation may approach the concerned organisation/individual to get the complete translation. Reprographic facilities should be made available for supplying reprographic copies of articles from journals, technical reports etc., keeping in view the copyright regulations.

Union Catalogues

National union catalouges of various types of documents such as books, periodicals, technical reports, standards and specifications etc., in the field of aeronautics, space and related areas received by the participating organisations in the country will be quite helpful. Their compilation should be the joint venture of all the participating organisations and finally produced by the organisation with the central facility. This should be regularly updated and maintained.

Other Suggestions

AIS should organise seminars and short term training courses on documentation to train the personnel engaged on documentation jobs in the participating organisations.

Services of AIS

The services proposed to be offered by AIS are:

i) (a) Current awareness service for general information of common interest to participating organisations.

   (b) Selective Dissemination of Information (SDI).

ii) Abstracting of technical papers.

iii) Management digest.

iv) Current Developments in the field of aeronautics and space and related disciplines within India as well as abroad.

v) Data compilation.

vi) Retrospective bibliographies.

vii) State-of-the-art and trend reports.

viii) Information concerning facilities available for manufacture of specific components and the list of suppliers both within India as well as abroad through trade literature.

Design of AIS

AIS may be designed to supply bibliographic references, sometimes including abstracts of stored documents, in answer to queries submitted by the user population. From an operational view point, in 'on-demand' servicing of user queries, a search is initiated only on receipt of a user query and responses are provided in answer to queries. In addition to this, other services such as 'current awareness service' and 'selective dissemination of Information' (SDI) may also be provided with the same input to AIS. In selective dissemination of information (SDI) user subject interest profiles are stored in the system which are matched against the newly received information items. Although 'on-demand' and 'SDI' services require the same information analysis and query decoding, the size of information files to be processed is normally smaller for SDI than for 'on-demand' searches.

Information retrieval operations may be broken down into four main types:

i) Information analysis;
ii) Information storage;
iii) Search operations; and
iv) Retrieval processing

Information analysis basically consists of identifying the document or query content by set of terms consisting of individual words or phrases together occasionally with term weights to reflect the presumed importance of each term. In practice, however, instead of term weights a query formulation is constructed with Boolean operators 'and', 'or' 'not' to construct the query terms. Retrieval is affected by comparing the terms sets pertaining to queries and to documents respectively, and by bringing to the user's attention those documents whose term sets match the query specification.

Two types of information storage organisations are currently in practice viz., a direct file and the inverted file. Direct file organisation has one main disadvantage i.e. to obtain complete answers, it is necessary to search the entire document file because each document must be compared with the query statement. The required search time is therefore substantial and users may in many cases have to wait for days or weeks before answers are received.

To reduce search effort, it is customary to impose some order on the stored file and to restrict the search operation to only those subportions of the file that are likely to contain material of interest. This is achieved by storing all items identified by a common keyword, and by using an auxiliary index file or directory, to obtain access to individual subfiles. This type of storage organisation is called inverted file.

In order to perform search in an inverted file, one access per query term is required into the inverted directory, followed by one access in the main file.

How It Should Operate

AIS can operate on similar lines as INIS (International Nuclear Information System) is working. The decentralisation should be one of the 'unique features'. The Bhaba Atomic Research Centre receives magnetic tapes from INIS and brings out information services from the same through a suitable computer programme. It is practically impossible for any one organisation to control the world's output of literature comprising of books, journals, technical reports, reprints, conference proceedings, etc. in aeronautics, space science and its related disciplines. It can be made possible by decentralising the input preparation and output utilisation. AIS may obtain the NASA magnetic tapes and process them to provide SDI service to the users based on their subject interest profile. It should also participate in European Space Documentation Service through inputting the literature from India and utilise the information stored by them for the benefits of the users of AIS.

Decentralised Input Preparation

The proposed input will involve two stages:

i) An intellectual activity of identification and selection of documents and preparation of their bibliographic description in a standardised form, categorisation, indexing and abstracting. It would be a manual process; and

ii) A bibliographic information into a machine readable form. Former will be largely the responsibility of the participating organisation and latter should be centralised for technical reasons. In this system each participant organisation will be responsible to scan the literature received by it which should be predetermined and specified for each participating organisation to avoid duplication of effort. The concerned bibliographical data will be centralised at one of the participating organisations having computer facilities.

Centralised Processing

The input so received will be checked, corrected and transferred to machine-readable form. The entire input received is merged and the output will be printed and sent to participating organisations for further utilisation and dissemination. In fact output can be used for a number of purposes such as current awareness service, SDI etc.

The cost of input operation will be shared, hence it will not become a burden on any one organisation.

AIS as a Document Retrieval System

All the references retrieved and supplied to the user against his request should be backed by the concerned document supply which may be either a xerox/photocopy or the original documents.

Conclusion and Comments

Scientific and technical information is essential both for the selection as well as pursuit of the R&D projects. Non-availability of complete and uptodate information may lead to costly duplication of research and development work. Our resources being low, the information services which are normally kept at the lowest rung of priorities should get their due importance.

Computerised information retrieval system is the only possible solution at present to cope with the information requirements of our scientists due to the information explosion and proliferation at an exponential rate. It would be incorrect to say that such sophisticated systems are required in case of large number of users only. The need for such a system should be based on speed and exhaustiveness with which the information is retrieved from the proliferating literature. Moreover in case of computerised information retrieval systems with one input we can get output in a number of formats. However, such a system can work as a joint venture of various organisations because of its prohibitive cost.

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IRANIAN DOCUMENTATION CENTRE

K SETTY UMAPATHY
Dept.of Library Science
Pahlavi University
Shiraz - Iran

Dr. Mervin Smith, the Secretary of the Central Treaty Organization (CENTO) originated the idea of an Iranian National Documentation Centre. At his request Dr. John Harvey, a Fullbright scholar at Tehran University submitted proposals for the establishment of Irandoc and Tebroc to the Ministry of Science and Higher Education. The two centers were established in 1967. They came under the administrative control of the Institute for Research and Planning in Science and Education which was established in 1968.

WHAT IT DOES[1]

Irandoc's main objective is to collect, organize and service scientific documents required for researchers at the national level. It locates documents and saves the time of researchers. It has established a national research library covering science, technology, and social sciences which is open to researchers in Iran. It is the first modern research library in Iran. Irandoc has realised that it is not possible to exploit the available knowledge without the use of reference tools such as indexes, abstracts, bibliographies directories etc. Hence it spends a considerable part of its resources in preparing and publishing such tools. It does research in information and documentation work. It encourages the establishment of new documentation centers by providing advice and practical help. It acts as a co-ordinating body for documentation work in Iran. It participates in regional, national and international information networks. It serves as a link in the World Scientific Information Network System (:UNISIST). It co-operates with Pakistan National Scientific Documentation Centre (PANSDOC) and Turkey Documentation Centre (TURDOC) and works with International Federation of Documentation (FID) and is an active member of FID Committee for Developing Countries. It works with the International Federation of Library Associations (IFLA), American Society for Information Science, ASLIB, LA, ALA, SLA and All Union Institute for Scientific and Technical Information. USSR (VINITI) and several other organizations. It acts as a link between research Institutions and researchers throughout Iran. It promotes mutual contacts among researchers through its publications. It has been the pioneer in interlibrary loan activity in Iran since its inception.

Organization

Irandoc is organized into four departments : Library; Processing; Nonbook Material Indexing; Publications; and the Documentation Research Group (See Figure 1). It has a staff of 71 persons. Ten of them have a Master's in Library Science nine a Master's in a subject field, two a Doctoral Degree, and 15 have a bachelor's degree. Many of its employees have completed short term courses in library science.

Resources

Irandoc's library has a collection of over 20,000 books and 4,000 periodical titles covering science, technology and social sciences. It has over 13,000 government documents. It collects university theses and currently has over 3,000 theses. The materials in the library are organized according to Library of Congress classification system. It has over 3,000 members. A prospective member should have atleast a bachelor's degree.

Services

The library provides interlibrary loan service. It prepares bibliographies for researchers on request. A much appreciated service of Irandoc is its photocopy service. It maintains contact with The British Library's Lending Division Boston Spa, and the Centre de Documentation de Researche Scientifique, Paris. During 1974 it provided 8104 pages of photo copy material. (2) The Library provides reference service in person, by phone or by mail. An average of 20 questions per day are answered. The processing department selects books and periodicals. Tebroc catalogs books for Irandoc. The processing Department is also in charge of Irandoc's exchange program which began in 1971. Materials were exchanged with 110 Iranian and foreign Institutions during 1975. (3) Nonbook material Indexing Department is in charge of indexing programs. Irandoc's publications Department has published several useful reference tools such as IRANIAN NATIONAL LIST OF SERIALS IN SCIENCE AND SOCIAL SCIENCE, bibliographies covering Farsi materials in agriculture, dentistry, education economics; BIBLIOGRAPHY OF THESES IN MEDICINE AND PHARMACOLOGY; DIRECTORY: OF IRANIAN LIBRARIES; A GLOSSARY:OF LIBRARY TERMS; SCIENCE ABSTRACT BULLETIN, Subject Guide to Iranian Librarianship literature in English 19th-20th Century; IranDOC's SOCIAL SCIENCE ABSTRACT BULLETIN, DIRECTORY OF IRANIAN NEWSPAPERS AND CONTENTS PAGES - IRANIAN SCIENCE AND SOCIAL SCIENCE JOURNALS. Irandoc's Documentation Group is preparing the first Farsi Thesaurus. It provides consultancy services and researches in information storage and retrieval problems. Rahmani recommends the provision of translation service and publication of a periodical listing research projects completed as well as those in progress and in planning stage. (4)

THE TEHRAN BOOK PROCESSING CENTRE (TEBROC)

Most Iranian libraries do not have professional catalogers and adequate bibliographic tools. Only academic and some special libraries use the Library of Congress Classification system or the Dewey Decimal Classification system. A large number of libraries still classify their collection according to broad subject categories, author or title, accession number or even by size. The 1973 survey of the Legal Committee of the Iranian Library Association found this to be true. (5) These shortcomings, coupled with the awareness of new service ideas developed in advanced countries and the influence of Fullbright American scholars in Iran such as Dr. Harvey precipitated significant developments in Iranian librarianship.

Organization

The Tehran Book Processing Centre - the first central library book processing centre in Asia - was established in September 1968. It is a major force behind the development and professionalization of Iranian libraries. It is now functioning as an unit of the Institute for Research and Planning in Science and Education (See Figure 1). Tebroc is organized into five departments : Cataloging and Classification; Planning; Selection and Acquisition; Bibliography; and a library research group. (6)

Services

Tebroc offers technical processing services such as book selection, acquisition, cataloging and classification of library materials in all subjects and languages. It catalogs books on contract for libraries. It uses the Anglo-American Cataloging Rules and the LIBRARY OF CONGRESS SUBJECT HEADINGS, for all books it classifies and catalogs with the exception of those in Persian and Arabic. It provides both LC and DDC numbers on its printed cards offering a choice between the two. It prepares catalog cards for sale for all Farsi and Latin books it catalogs. Further, it provides book pockets, jackets, charge cards, due date slips, labels and delivers books to the customers ready to circultate; and catalog, shelflist cards ready to file.

Tebroc has 79 contract and card customers using its cataloging services. 56 of them are located in Tehran and others are in various provincial cities. (7) The University of Michigan Library, USA subscribes to all Farsi cards produced by Tebroc. During the first year of its operation Tebroc cataloged books free of charge in order to advertise its services. Presently, a fee of 50 Rials (8) per book is charged. Its card customers include Government, academic, school, public, childrens' and special libraries in Iran. All libraries buy a complete set of cards for each title. Forty four libraries buy only Farsi cards. Its publication, BOOKS CATALOGED BY TEBROC is used for ordering cards. Some libraries use it as a book selection and a bibliographic verification tool.

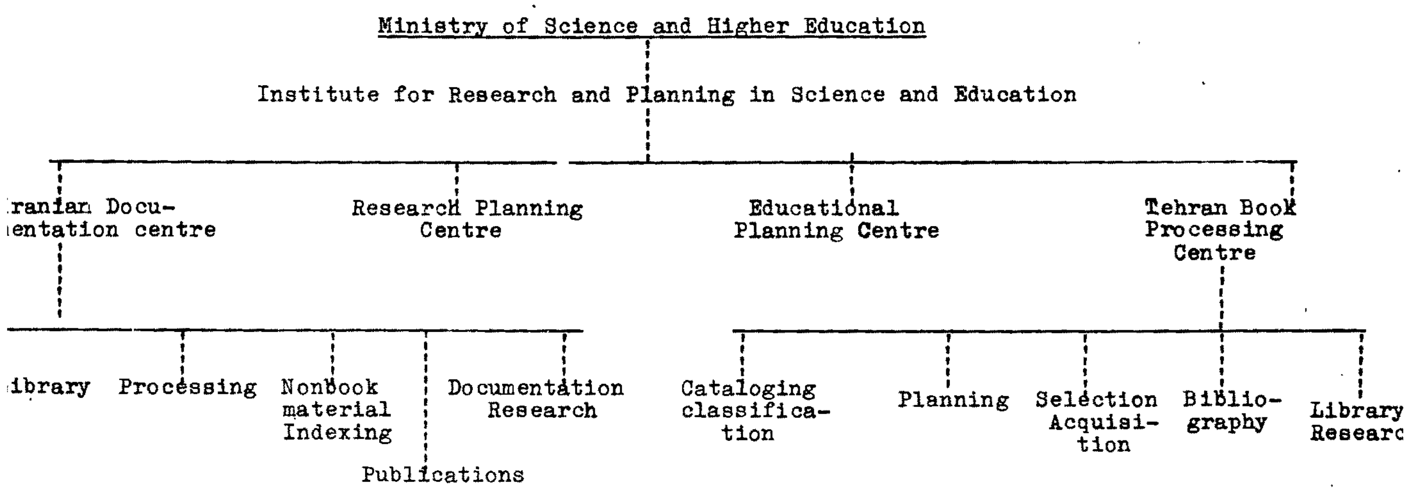
TEBROC'S BIBLIOGRAPHIC CENTRE

Tebroc has a bibliographic centre housing national bibliographies, book reviews, who's who's, and books and periodicals covering library and information sciences in Iran and abroad. The materials are in Farsi, Arabic, French and English languages. The centre is available for use free of charge to all librarians, students of library science and researchers. Currently, it has over 3200 titles and is perhaps the best collection of its kind in Iran.

STAFF

Tebroc is a major library organization in Iran. Currently it has 67 persons on its staff. Seventeen of its employees hold a Master's Degree in library science or in a

Figure - 1



Organization chart of IRANDOC and TEBROC

subject field while one person holds a doctoral degree. It makes an effort to recruit outstanding library science graduates. It encourages the continuing education of its professional staff and helps them in participating in national and international conferences in the field.

TEBROC'S UNIQUE FUNCTION

The standard cataloging and classification tools created basically for the Latin alphabet, do not help in cataloging and classifying works in arabic script which includes Farsi. Hence, Tebroc, since its inception is attempting to provide basic tools for the organization of materials in Farsi. Cataloging Farsi materials and creating tools necessary for it is a major undertaking of Tebroc. It has translated, adapted, and created required tools. It has published special expansions of Dewey Decimal classification for Iranian languages, literature and Islam; and an expansion in Library of Congress classification covering Islam. It has plans for publishing expansions in both systems covering geography, history, philosophy, fine arts, and handicrafts of Iran. (9)

It has prepared two systems of author marks based on Cutter-Sanborn and Library of Congress system. It is working on a special Iranian adaptation of the subject headings based on the subject content of books it has cataloged. Tebroc library research group is in charge of these projects. Tebroc is compiling the Iranian National Union Catalog in three sections : Latin; Farsi and Arabic; and Iranology. This will promote exchange of knowledge and inter library loans.

Irandoc and Tebroc are leading library information institutions heralding the dawn of modern Iranian librarianship.

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SELECTION OF SECONDARY INFORMATION SERVICES

D.K. GUPTA
Lecturer,
Dept. of Library Studies,
University of Ibadan,
IBADAN

The criterion based on S.R. Ranganathan's Five Laws of Library Science to select the most appropriate secondary sources of information for a particular environment of information users has been discussed.

INTRODUCTION

1.1 Role of the Primary sources

It is now commonly and widely accepted fact that primary journals are the main source of communication for the scientific and technological developments in any part of the world. The advancement of science has been made possible, to a large extent, through these journals. It is also an acknowledged fact that active scientists and engineers need to keep up-to-date with the latest developments in their respective fields. But they are in danger of being swamped by the immense volume of literature streaming out from the press through these journals.

1.2 Evolution of Secondary Services

The purpose of primary journal when it started in 1665 was the same which is even today but the flood of primary publications (approximately 50,000 periodicals) in science and technology alone has led to the appearance of the so called secondary services. The great flood of literature has given rise to extensive remedial measures which in the field of information science are known as 'Great Flood Rescue Operations'. The alerting function gave birth first to the review journals, later to the abstracting/indexing journals. By 1950, the flood introduced great delay in the publication of these abstracting services with conventional methods, making the abstracts as history rather than news.

1.3 Secondary Services

Secondary information services are those which consists of all media, techniques and activities by which the scientists are made aware of and assisted in getting the primary information. They are relatively new and are the keys by which the information contained in the primary sources can be to a large extent be found for useful purposes.

1.4 Objectives of Secondary Services

The objective in each case is to divert the uncontrolled flow of publications into properly regulated channels. In most of the disciplines in science, these services have occupied important position in regulating the streams of the literature. As this discussion is restricted only to the written communication and not the oral or other means of communication, here the objectives of only such services would be specified.

Their main objectives are;

1. To alert readers to the latest developments in a given area (Current awareness service);
2. To serve as a means of locating information in original literature (Retrospective searches).

1.5 Types of Secondary Services

The services may be divided into the following categories:

A: By publication trend,

1 INDEXING SERVICES (Quickest),

2 ABSTRACTING SERVICES (Medium speed), and

3 BIBLIOGRAPHIC SERVICES(slow speed).

B: By purpose;

1 General purpose, (Chemical Abstracts, Engineering Index etc.);

2 Specific purpose (Geophysical Abstracts);

3 Specific type of publications (Compilations, Advances in Geophysics).

1.6 Present Status of Secondary Services

There are a multitude of indexing and abstracting services available to the scientists of the world. The National Federation of Abstracting and Indexing Services has listed over 1,800 services in 40 countries in its directory. A more recent survey of the Federation has shown that its member services alone would produce over 850,000 abstracts and citations etc. during the year 1971 which is almost 4 times of what was produced only 13 years ago in 1957.

2 EVALUATION OF SECONDARY SERVICES

Different types of services have originated according to the requirements of the users and they have been started by various organizations, professional and private, commercial publishers, institutes and societies, etc. In their style, coverage etc. all are intended to meet the needs of the scientists and technologists in the best possible way, speedily and economically. Many varieties of these alerting and announcement services exist today. They mainly differ in their coverage, formats, frequencies, method of production and presentation etc. How far a particular service serves a defined population of users, may be examined on the basis of certain criteria. These criteria may be used in selecting a suitable service for a particular environment. These principles are discussed below based on the Five Laws of Library Science as enunciated by Dr. S. R. Ranganathan.

2.1 Library Laws and Evaluation of Secondary Services

1 INFORMATION IS FOR USE: The information for the promotion and practice of bringing the nascent micro thoughts into the use by the specialists (scientists/technologists). The implication of this law on the selection of secondary services is that the information about the information should be available. This is important because of the huge amount of information available today, otherwise the needed information may not be available at all. It may remain hidden or may be completely lost. Therefore to keep a proper and timely track of the information published in the primary sources these services are important.

2 EVERY USER HIS INFORMATION: From the flood of the published literature getting the required information is simply not possible unless it is pinpointedly indexed and classified for retrieval purposes. This law has its implication about the presentation and format etc. of a service. Every specialist should get his needed information. It is related to the coverage aspect of the required information.

3 EVERY PIECE OF INFORMATION TO ITS USER: Any bit of information, generated in any corner of the world may be of some use to some one. Therefore the intended service should have a wide and exaustive coverage of information for its users. Not a bit of the information should be missed. It is also concerned not only with the coverage aspect but also the arrangement and presentation of information.

4 SAVE THE TIME OF THE USERS: The information pertinent to somebody should be available without loss of time, and expeditiously. Its implication is the time factor of the service that time lag in the primary publication and secondary publication and frequency of the service.

5 INFORMATION IS AN EVER GROWING ELEMENT: Every moment new ideas are being generated throughout the world. The intended service has to take this factor for consideration. This is related to storage, cost/economic factor of the service. This indicates that the service should be so compact that it is cheaper and does not create problems in storing and preserving it for future use.

Thus, it may be summarised that a service is efficient if it promotes the practice of bringing the nascent micro thoughts into use by the specialists pinpointedly, exhaustively, expeditiously, keeping in view the fact that new ideas are being generated in all the disciplines throughout the world.

3 CRITERIA FOR SELECTION OF SECONDARY SERVICE

As discussed above the criteria can be fixed to evaluate a particular service for selection which may satisfy the five laws of library science.

3.1 Coverage.

No commercial, professional or institutional indexing and abstracting service can adequately cover the information which may be available in the different corners of the world or which may meet the requirements of a particular information centre. But, however, this mav be applied in a way as to how best (maximum) one particular service can serve the organization's interest.

3.11 Type of Information Covered by the Service

It is to be seen as to what type of information is covered by the service?

- Periodicals,
- Monographs,
- Bulletins,
- Conference proceedings,
- Thesis/dissertations,
- Research reports,
- Private communications,
- Short communications,
- Patents/standards/specifications, etc. etc.

3.12 Geographical Coverage

In most of the cases, every service has the maximum coverage for the literature of the country of the origin of the service. The coverage is inadequate for the literature which is produced elsewhere. The reasons are obvious.1)Non-accessibility of the original documents, and 2) Documents available in foreign languages. But today the situation demands a wide coverage. The scientific and technical literature is now being produced from various countries in nearly 40 different languages. A lot of innovative information could be available if the coverage is proper and adequate.

3.13 Comprehensiveness/Exhaustiveness

Following two points are to be considered:-

1. How much literature is covered on the core or principal subject(s) for which the service is intended.
2. How much literature is covered for the disciplines which are supposed to be peripheral subjects, border subjects, interdisciplinary subjects, related to the main subject of interest.

This aspect is concerned with the depth of coverage which can be defined as the ratio of the numbers of abstracts/items appeared in the secondary service and the total number of articles/items published in the primary sources. The selectivity for specialization should be based on high recall value rather than being highly relevant. This means the amount of publication and presentation.

3.2 Completeness and Arrangement of Information

This aspect is concerned with the manner the abstracts/items are arranged and with parameters of information. In most of the cases, the depth of the commercial services is not sufficient to serve the needs of an individual. Actually the arrangement of entries, depth of indexing etc. are very helpful in pinpointing a piece of information or retrieving the information for a specific purpose. It not only serves in locating the specific information but also allows one to browse the related subjects also if the entries are arranged according to some helpful arrangement. There are many schemes on which these various services are based, but the best is one which is compatible with the internal one.

3.21 Abstracting Services

Besides the arrangement of the items, the service depends upon the quality of the abstracts. An abstract should be easy to skim. An abstracting journal should permit the user to decide quickly whether the abstracted item is of interest and leave him with both, time and inclination to read more abstracts. Generally, these abstracts are either informative or indicative. The main idea is to replace the original item with this well organized summary. It depends on who does the abstracting job. Whether the abstracts are prepared by the experts or the service includes only authors abstracts? Intellectually it should serve the intended purpose.

3.22 Indexes

Indexes are very important for locating items of specific interest. It is important to assess whether the indexes are adequate for doing this job from different points of view.

A service may provide cummulative indexes periodically, if so at what interval?

Type of indexes provided may be;

Subject index,
Title index,
Author index,
KWIC index,
Literature index etc.

The indexing is very important aspect for using the service most efficiently in terms of operation, storage, and retrieval. It is helpful to users as well as for information service staff. Retrieval system's performance and reliability depends upon indexing system.

3.3 Timing Factor

Timing factor is most important while considering any aspect of information or information service. An information service is to be prompt in its appearance; regular in its frequency. If the frequency is high, it has additional advantage that it won't be voluminous and bulky which repels the interest of the users. It would be handy in its appearance

Time-lag is referred to as the nominal time in months between the date of the primary journal/source in which the article/item has been published and the date of the publication in the secondary service in which the information about the original one is published. The interest of the user is lost if the time exceeds 9 months or so. The user may get the same information from some other sources. Therefore, for a good service, time lag must be minimum.

Rate of completion is another factor which is bothering everybody who is concerned with information use or service. This is referred to the number of issues of secondary services and the time lapse needed to cover up completely the information from the primary sources.

Actually the information generation is much faster than the coverage by secondary services.

Therefore, there is all the time some time lag. For maintaining its regular frequency it has to cover only a certain portion of information on priority consideration and rest in the subsequent issues. Therefore it is necessary to note as how this lapse is covered by a particular service.

3.4 Other Factors

3.41 Media of Production

It is to be noted as to what is the media of production of the service - Hard copy, Microfilm or a Magnetic tape. Printing is conventional or it is computer setting. It provides the additional advantages or disadvantages while designing the local information services.

3.42 Search Strategy

For search strategy, another point is to be considered whether the service has alternative and additional facilities? Secondary service is supported with the tape search facility, if so whether this may be utilized by a particular information centre or not? If it is microfilm, a photocopy may be alternatively available. This has an impact while designing in-house services.

3.5 Cost

The cost is very important factor while selecting a particular service. In most of the cases, for the existing services, the cost is very high comparatively. The cost depends upon the type of service, if it is of general nature, the cost is little less; if it is specific, the cost is naturally high for obvious reasons. The cost is distributed among the number of subscribers. However, the cost is no factor in case of relevancy and pertinent requirement. If it serves the desired purpose, the cost can be tolerated to the extent to which it serves the purpose. An idea of the costs of the various services may be available from the Standard list of World Periodicals. A general idea about the cost per abstract for the different services is given below which itself explains the importance of the service or the status of the service:

Biological Abstract	$ 8.70
Chemical Abstract	26.00
Engineering Index	10.00
Geoscience Abstract	13.50
Mathematical Reviews	31.20
Meteorological & Astrophy	33.30
Psychological Abstract	9.50

4 CONCLUSIONS

There are a few thousand secondary services today in the service of the society and there may be many more with the present trend of exponential growth of publications, research findings and registration of technical developments. Every service serves a limited purpose in an information centre and no one is complete in its coverage and can give full satisfaction to the requirements of an organisation. The problem of selection then is to find out those services that have the best combination of coverage (primary literature as well as the disciplines), appropriate price, prompt delivery, adequate back log of stored data, and adequate/proportionate machine handling characteristics, etc.

AUTOMATED SYSTEM FOR GENERATING THESAURUS FROM SUBJECT REPRESENTATIONS

F.J. DEVADASON
V. BALASUBRAMANIAN
Documentation Research and Training Centre
Indian Statistical Institute
Bangalore-560001.

Several experiments were conducted at the Documentation Research and Training Centre for generating thesaurus from schedules of classification and subject representation structured according to postulates and principles for facet analysis. The work reported in this paper uses a coding scheme developed for augmenting the subject strings to make them suitable for generating thesaurus. The system is fully automatic unlike earlier systems. It has five phases namely, Coding phase, Term-pair Generation phase, Coordinate Term-pair Generation phase, Translation phase and Printing phase. The system is described briefly giving the systems flow chart and inputs and outputs of the different phases together with a sample printout of a model thesaurus generating using test data of about 60 subject strings in telephony.

0 INTRODUCTION

01 Theasaurus

A thesaurus is a list of structured compulsory keywords. It could be defined as "a controlled dynamic vocabulary of semantically related terms offering comprehensive coverage of a domain of knowledge". It is a controlled list of terms, with indication of conceptually associated terms, for use in information retrieval systems [3]. The conceptual structure and terminological control provided by a thesaurus contains.

1) Structured systems of concepts with indication of hierarchical and associative relationships between the concepts; and

2) All the terms that designate a particular concept - that is synonymous terms.

The design and construction of thesaurus of terms in subject fields for use in information storage and retrieval has gained much importance in recent years and several thesauri in different subject fields have been published.

02 Computer Generation of Thesaurus

Several experiments were carried out at the Documentation Research and Training Centre in the computer generation of thesaurus. To begin with a faceted scheme for classification for a specific subject field was used in the computer generation of thesaurus [14] in which it was possible to incorporate the hierarchic relationship (HR) of terms and only one type of non-hierarichic relationships (NHR), namely, the coordinate relationship of terms. In another approach, subject structures (subject strings) arrived at by facet analysis based on the general theory of Library Classification was used [13], in which it was possible to generate HR and all NHR except coordinate relationship (CR). In yet another approach based on subject strings [4], apart from generating HR, all NHR including CR were also generated, based on the principle that all the NT's to a particular term are coordinate among themselves. Also a set of typology of NHR [8, 9] were used in categorising the different associative relationships. The procedure used in generating thesaurus in this method requires.

1) the manual preparation of a term-code dictionary in which each of the terms is given an unique serial number and kept in card form, alphabetically arranged for manual reference, and created as a directly accessible file on disk using the serial number as key for machine reference;

2) the manual preparation of a synonym directory having the serial number of the terms and serial numbers of all the synonymous terms to it, created as a directly accessible file on disk using the serial number as key; and

3) encoding of the subject string by replacing the terms by their respective serial numbers and the typology of NHR by their respective codes for use as input to the program [4, 5].

The algorithm for generating the different entries for the thesaurus follows almost a single rule that "each term in the string can create entries (term-pairs) for the thesaurus with the next term in the string, the process being carried out from left to right of the string" [6]. As the program is 'rule-based' it is rigid in generating the different entries for the thesaurus, in the sense that a term can generate an entry only with its immediately preceding and immediately succeeding terms. If a term has to generate a relationship with a term which is separated by a term occurring in between (the sequence of the terms being determined by facet analysis), then a separate subject string, bringing the two terms in relationship is to be coded and input to the program.

03 Scope of the Paper

In this paper, a set of programs for generating thesaurus 'based on input codes' for generating the different entries i.e. an 'input code based' system for the manipulation of subject strings to generate a thesaurus in a subject field is presented. Also the current system does not require any of the manual work mentioned in Sec 02 above, for its operation.

1 SYSTEM OVERVIEW

The subject structures (subject strings) formulated using the Postulates and Principles of General Theory of Library Classification [11], augmented with codes denoting the typology of relationship between the terms forming the string - are input to a program CODER. This program generates an unique serial number for each of the unique terms in the strings and creates a term-code dictionary and rewrites the input strings as coded strings replacing the terms by their respective serial numbers. The coded subject strings are manipulated by a program GENERATE which generates the different term-pairs forming entries in the thesaurus according to codes supplied along with the strings. The generated entries are sorted and coordinate relationships between NTs to a particular term are generated by another program GENCORD. The output file created by this program is retranslated into the natural language using the term-code dictionary created in the first step and are sorted alphabetically and printed in double column format as thesaurus by a print program. The overall system flow chart is given in Appendix-A.

2 INPUT TO THE SYSTEM

21 Formulation of subject strings

The input to the system is prepared following the specific steps of the Postulational Approach to Library Classification [2, 7, 11].

The title of the document or the raw specification of the reader's query is taken as starting point.

All the specific subjects dealt with in the document/reader's query are determined and expressed in natural language.

Let one of the specific subjects be expressed as "In telecommunication traffic flow in subscriber transmission line"

By analysis, each of the specific component ideas in the subject and the broader or superordinate ideas or upper links implied by each of the component ideas are determined. The apparatus words are removed and the kernal terms are written as given below:

> Telecommunication, Traffic characteristic, Traffic Flow, Transmission, Transmission line, Subscriber line.

The kernal terms obtained are arranged in a helpful sequence using the principles for facet sequence of the General Theory of Library Classification [10, 11]. The string thus arrived at is given below:

> Telecommunication, Transmission, Transmission Line, Subscriber Line, Traffic Characteristics, Traffic Flow.

The relationship between pairs of terms NT or RT and the typology of the relationship are determined and the appropriate codes (described in Sec 22 below) are used to augment the subject string for computer manipulation. The coded string is given below:

```
$0 TELECOMMUNICATION $ (05-)
   TRANSMISSION $0 $5 $6 (13-)
  TRANSMISSION LINE $3 $6 $7 (07-)
   TRAFFIC FLOW
```

22 Codes used in String Manipulation

The codes used in the subject strings for generating entries for a thesaurus are of two types, namely.

1. those that indicate which terms are to be related and whether the relationships is NT or RT; and
2. those that indicate the typology of relationship.

221 Codes for Relating Terms

1) The codes for generating RT relationships are:

$1 - Generate an RT relationship with the immediately succeeding term using the typology of relation code, and generate a reverse

RT relationship changing the position of '-' in the typology of relation code.

ø0 ø5 ø6 ø7 ø8 - Generate an RT relationship with the immediately preceding term with the same 'code' taking the typology of relationship code of the term being manipulated and generate a reverse RT relationship changing the '-' in the typology of relation code.

2) The codes for generating NT relationships are:

ø2 - Generate an NT relationship with the immediately succeeding term using the typology of relation code of the term being manipulated and generate a reverse BT relationship changing the '-' in the typology of relation code.

ø3 - Generate an NT relationship with the immediately succeeding term, and generate a reverse BT relationship. (No typology of relation codes are used).

A special code ø4 is also provided to stop generating any relationship between the terms between which it is coded.

3) The code for generating synonymous relationship is:

/ - Generate synonymous relationship with the immediately succeeding term, and generate a reverse USE relationship.

222 Code for Typology of Relationship

When subject representations are facet analysed and structured into subject strings it could be found that the relationships between ideas forming component of subjects are of the NHR associative type. It has been found helpful to identify patterns of association of ideas, forming components of subjects and categorise the relationships into a few types using suitable phrases and also to group the concepts on the basis of these types of relationships.

Several studies have been made in this area [9]. Almost 39 types of relationships have been identified so far [8]. In general, genus-species and part-whole relationships are taken as hierarchical relationships and represented as NT and BT in a thesaurus. Representation of HR relationships could also be categorised to achieve better display format and for generating RTs out of NTs to a particular concept/term (See Sec 33).

The following is an extract from a table of typology of relationships we have used:

00	Coordinate ideas	10	Action on
01	Source for	13	Device used for
04	Environment of	16	Types of
07	Property of	17	Parts of
08	Process used	23	Uses of

Note: It would be helpful to develop the typology of relationship codes for the subject of a thesaurus based on the characteristics used for deriving the different isolates forming components of the subject and those used to group the different speciators for the different isolates concerned.

3 PROCEDURE

31 Translation of Input Coded Strings

The subject strings augmented with codes for relating terms and codes for typology of relation are punched on to cards starting from column 1 to 74. Any number of cards could be given for a subject string, the end of the string being denoted by a "#" mark. The card image of input subject string is given in Appendix-B. This is read by a program 'CODER' and a table is built in the memory. Each of the unique terms in the string is entered in the table with sequential serial numbering simultaneously replacing the respective terms in the strings by their respective serial numbers. As and when a term is encountered in a string it is matched with existing term in the table and its serial number is picked if the term is available, if not the term is entered as the last entry in the table, with appropriate serial number and that serial number is replaced in the string. The built term-table is copied as a term code dictionary— as a sequential file on a magnetic tape and the coded strings are passed on as a data set for further manipulation. An example of coded subject strings is given below:

```
ø0 0001 ø0(05-) 0002 ø1ø5ø6(13-)
   0003 ø3ø7 0004 ø0ø5(07-)
   0005 ø3ø6ø7 0006 #
```

0001	Telecommunication
0002	Transmission
0003	Transmission lines
0004	Subscriber line
0005	Traffic characteristics
0006	Traffic flow

(05-)	Function of -
(13-)	Device used for-
(07-)	Property of -

32 Manipulation of coded subject string

The general rule for manipulating the string is that each of the terms form a term-pair with the succeeding term in the string following the 'two types of codes' in between them. The manipulation starts from left and carried on to the right of the string. Once an entry is prepared the reverse entry is generated automatically by changing the position of the 'context term' and the 'lead term' In HR entries, the relationship NT is changed to BT in reversing the entry. In RT entry the relationship does not change. In the case of entries having the typology of relation codes, the position of '-' (in the typology of relation codes) is changed from prefix to suffix and vice versa as appropriate. In the case of synonym indicated by '/' appropriate to the string, a SYN and USE reverse entries are generated.

When the codes for relating terms are not $1 or $2 but fall into the group $0, $3, $5, $6, $7, $8, etc. separate pointer-tables of these terms are built along with the typology of the relation code of the succeeding term having the same code, and term-pairs are generated using these pointer-tables. A detailed description of the logic of the program and algorithm are given elsewhere [1].

Every time a term-pair or thesaurus entry is generated it is written as a directly organised (random) data set on disk if it is not already written in it. Unique coded thesaurus entries thus generated are sequentially written as a data set for further manipulation. This process is done by a program 'GENERATE'.

For example from the coded subject string:

$0 0001 $0(05-) 0002 $2$5$6(13-)
0003 $7 0004 $0$5(07-)
0005 $3$6$7 0006≠≠

The following coded thesaurus entires are generated:

0001 RT (05-)	0002	0002 RT (-05)	0001
0002 RT (13-)	0003	0003 RT (-13)	0002
0003 NT	0004	0004 BT	0003
0004 RT (07-)	0005	0005 RT (-07)	0004
0003 RT (07-)	0005	0005 RT (-07)	0003
0005 NT	0006	0006 BT	0005
0006 RT (07-)	0002	0002 RT (-07)	0006
0006 RT (07-)	0004	0004 RT (-07)	0006

Note: The coded subject representation does not contain '$' codes. In fact they are translated to certain alphabetic codes for internal manipulation by the machine.

33 Generation of Coordinate Entries

The generated unique thesaurus entries (term-pairs) are sorted in ascending sequence so that serial numbers for the same 'lead term' are brought together. The serial numbers of the 'context terms' that are NTs to a particular 'lead term' (having the same serial numbers in the lead term position, having the same typology code if any) are formed as a separate table and coordinate RT term-pairs are generated and written along with the term-pairs earlier generated onto a tape for further processing.

34 Retranslation of Coded Thesaurus Entries

The term-code dictionary created as a sequential file on tape is read into the memory as a table. The typology of relation code and their corresponding descriptive phrases are read from cards and built in the memory as another table. The generated coded thesaurus entries on tape is read. The serial number of both the lead term and the context term are translated into the natural language, using the term table built from the term code dictionary. The typology of relation code is also translated into the corresponding descriptive phrase using the corresponding table built in the memory. The translated entries are written onto a tape for further processing. The process is done by the program 'TRANSLAT'.

35 Sorting and Printing Thesaurus

The file of thesaurus entries in natural language, output of the program TRANSLAT is sorted alphabetically using the sort program available in the computer system. It is then printed out in double column format with proper indention for Lead term, relationship, typology of relation and context term. The format of the display of terms in the thesaurus is given in Appendix - C.

4. FURTHER IMPROVEMENTS

It is possible to include at the retranslation stage the number of times a particular term has occurred in the bibliographic entries in a data base. This will be useful in finding out in how many different documents a particular term has occurred especially in on-line retrieval systems. This has to be done using a word frequency count list as reference.

It is possible to keep the generated thesaurus as a machine readable indexed file on disk for use in on-line information retrieval systems. Further work in this direction is being carried out in DRTC.

5. PROGRAMS DEVELOPED

The programs developed for generation of thesaurus as outlined in this paper are written in ASSEMBLY and COBOL languages for IBM system/360-370 series computers. The programs have been tested at the Computer Centre, IIT, Madras. A sample test data of about 60 subject strings on telephony was run to generate a thesaurus. The number of unique terms were 145, the total number of term-pairs were 640. The programs were kept in a load module library and executed one after the other. The total CPU execution time (excluding compilation time) for 60 strings was 60 seconds. These programs will be used to generate a few thesauri and will be modified in the light of the experience gained to develop a software package for thesaurus generation.

6. ACKNOWLEDGEMENT

We are grateful to Prof. A. Neelameghan for his encouragement and guidance in the development to these programs. We are thankful to Prof. G. Bhattacharyya for permitting us to publish this paper.

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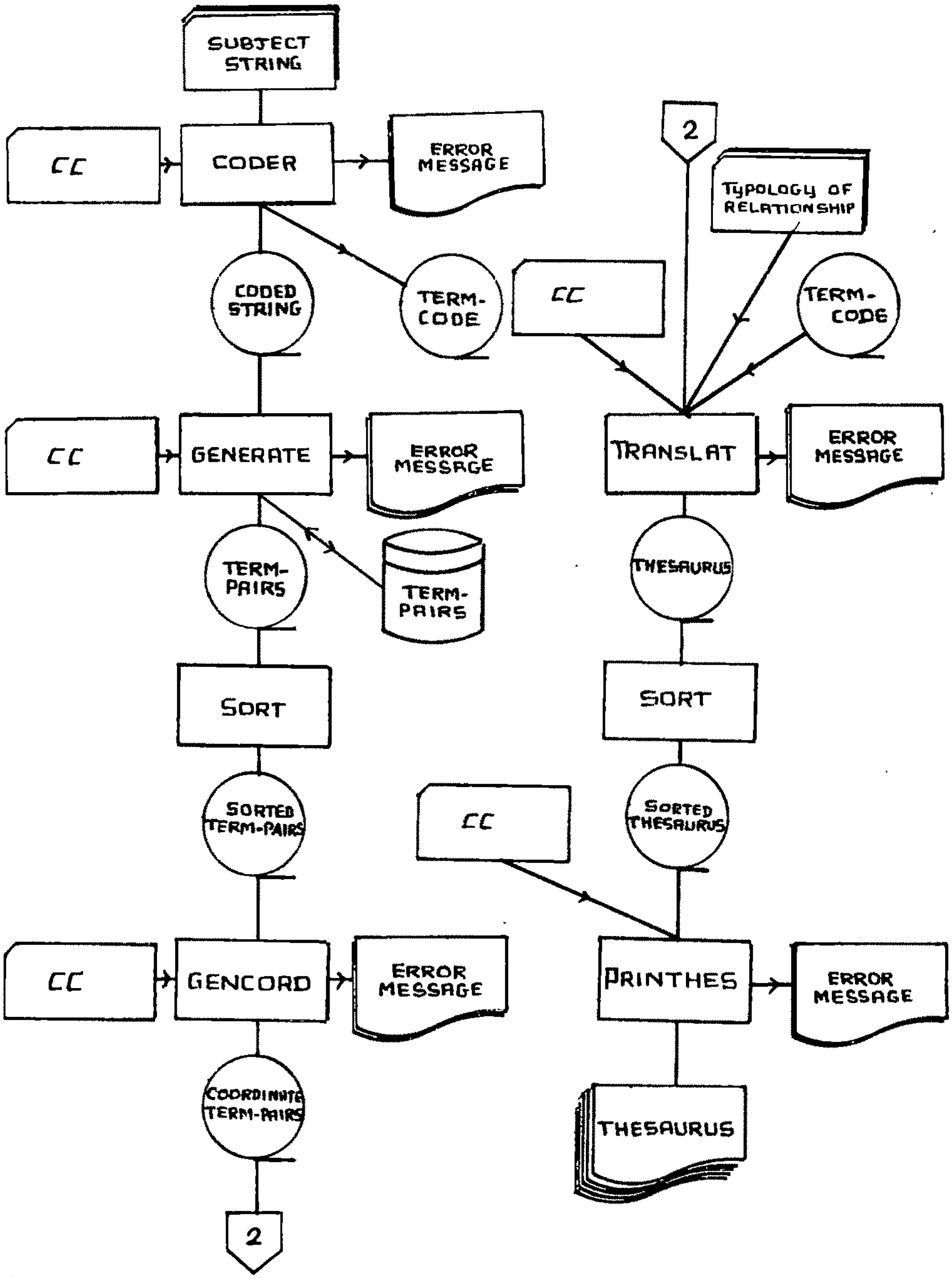

SYSTEM FLOWCHART

APPENDIX 1

```
$0$5$6TELEPHONE NETWORKS$3SWITCHING NETWORKS$3$6MULTI STAGE SWITCHING NETWORKS$3
ELECTRONIC EXCHANGE#
$0TELEPHONE NETWORKS(13-)$1MANUAL EXCHANGE$4MAGNETIC RELAY EXCHANGE#
$0TELECOMMUNICATION$3TELEMETERING$3CYCLIC TELEMETERING#
$0TELEPHONY(13-)$1TELEPHONE SET$3SUBSCRIBERS TELEPHONE SET$3TRANSISTORIZED SUBSC
RIBERS TELEPHONE SET#
$0TELEPHONE EXCHANGE$3MOBILE TELEPHONE EXCHANGE#
$0TELEPHONY(03-)$1SIGNAL$3VIDEO SIGNAL$4SIGNAL GENERATION$3VIDEO SIGNAL GENERATI
ON(07-)$1ENTROPHY#
$0$5TELEPHONE NETWORKS(17-)$2TELEPHONE LINE(16-)$2$5CABLE$3MULTICABLE LINE#
$0DATA TRANSMISSION(05-)$1$6COUPLING(13-)$1$5DATA TERMINAL(16-)$2REMOTE DATA TER
MINAL(13-)$1$5$6TELEPHONE LINE#
$0TRANSMISSION(13-)$1$5TRANSMISSION CHANNEL(07-)$1$6SIGNAL FREQUENCY(09-)$1TONE
FREQUENCY(07-)$1NOISE#
$0$5TELECOMMUNICATION$3SPACE COMMUNICATION(13-)$1OPTICAL DATA LINKS$3FIBER OPTIC
 DATA LINKS#
$0TELECOMMUNICATION$3LASER COMMUNICATION#
$0TELEPHONE NETWORKS(07-)$1LIMITER DIGITAL INTERVAL#
$0TELECOMMUNICATION$3$7$5$6RADIO COMMUNICATION(05-)$1TRANSMISSION$3$7$6MICRO WAV
E DEVICE#
$0$5$6COMMUNICATION ENGINEERING(05-)$1RELAY$4$6TRANSMISSION$4$6RECEPTION(24-)$1$
5STEREO SIGNAL(10-)$1$6REPRODUCTION(23-)$1$5SPEAKER SYSTEMS#
$0TELEPHONE NETWORKS(13-)$1SPACE DIVISION SYSTEMS#
$0TELEPHONE RECEPTION(07-)$1TELEPHONE RECEPTION QUALITY$3TELEPHONE INTERFERENCE
$3CROSS TALK#
$0TELEPHONE APPARATUS$3COMMUNICATION TRANSMISSION LINES$3TELEPHONE LINES#
$0TELEPHONE APPARATUS$3TELEPHONE RECEIVERS#
$0TELEPHONE APPARATUS$3TELEPHONE REPEATERS#
$0TELEPHONE APPARATUS$3TELEPHONE TRANSMITTERS#
$0TELEPHONE APPARATUS$3TELEPHONE VOCODERS#
$0TELEPHONE APPARATUS$3TELEPHONE COMPANDORS#
$0INTERFERENCE$3TELEPHONE INTERFERENCE#
$0TELECOMMUNICATION$3DATA TRANSMISSION$3TELEGRAPHY(13-)$1TELETYPEWRITERS$4TELEPR
INTERS#
```

APPENDIX

```
PLATE MODULATE TRANSMITTER                    5         RADIO COMMUNICATION
```

```
   RT    (ACTION ON-)
         SIGNAL DETECTION
         (COORDINATE IDEAS)
         COMPUTER COMMUNICATION
         DATA TRANSMISSION
         LASER COMMUNICATION
         RADIO COMMUNICATION
         SPACE COMMUNICATION
         TELEMETERING
         TELEPHONY
         VOICE COMMUNICATION
         (DEVICE USED-)
         OPTICAL COMMUNICATION LINES
         (FUNCTIONS OF-)
         TRANSMISSION

OPTICAL COMMUNICATION LINES
   RT    (-DEVICE USED)
         OPTICAL COMMUNICATION
         TRANSMISSION
         (ACTION ON-)
         SIGNAL DETECTION
         (TYPES OF-)
         PHOTO DETECTOR

OPTICAL DATA LINKS
   NT
         FIBER OPTIC DATA LINKS
   RT    (-DEVICE USED)
         SPACE COMMUNICATION

OPTIMAL INTEGER NUMBER
   RT    (-AFFECTED BY)
         CIRCUITS PERFORMANCE

PACKET SWITCHING SYSTEMS
   RT    (-PROCESS USED)
         COMPUTER NETWORKS
         DATA TRANSMISSION
         (DEVICE USED-)
         TELEPHONE CHANNELS
         TRANSMISSION CHANNELS

PHASE DISTORTION
   RT    (-AFFECTED BY)
         TRANSMISSION CHANNEL

PHOTO DETECTOR
   BT    (-TYPES OF,
         SIGNAL DETECTION
   RT    (-TYPES OF)
         OPTICAL COMMUNICATION LINES
         (PROPERTY OF-)
         SENSITIVITY

PLATE MODULATE TRANSMITTER
```

```
   NT
         AUTOMATIC PLATE MODULATE TRANSMITTER

POLARIZATION
   NT
         VESTIGIAL POLARIZATION
   RT    (-MODE OF)
         TRANSMISSION CHANNELS
         TRANSMISSION LINK

PROPAGATION
   NT
         LONG RANGE PROPAGATION
   RT    (-ACTION ON)
         RADIO LINKS
         TRANSMISSION

PUBLIC ADDRESS SYSTEMS
   RT
         VOICE COMMUNICATION
   RT    (PROCESS USED-)
         BAND WIDTH COMPRESSION

QUE PRIORITY
   RT    (-PROPERTY OF)
         MULTI-QUE TRANSMISSION
         (AFFECTED BY-)
         TRAFFIC FLOW MODEL

RADAR AND RADIO NAVIGATION
   BT
         COMMUNICATION ENGINEERING
   RT    (COORDINATE IDEAS)
         COMMUNICATION THEORY
         (COORDINATE IDEAS)
         RADIO COMMUNICATION
         TELECOMMUNICATION

RADIO COMMUNICATION
   BT
         COMMUNICATION ENGINEERING
         TELECOMMUNICATION
   RT    (ACTION ON-)
         TRANSMISSION
         (COORDINATE IDEAS)
         COMMUNICATION THEORY
         COMPUTER COMMUNICATION
         DATA TRANSMISSION
         LASER COMMUNICATION
         OPTICAL COMMUNICATION
         RADAR AND RADIO NAVIGATION
         SPACE COMMUNICATION
         TELECOMMUNICATION
         TELEMETERING
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PLATE TECTONICS: A STUDY OF TRANSMISSION OF IDEAS

D.K. GUPTA
Lecturer, Dept. of Lib.
Studies, University
of Ibadan, Ibadan,
Nigeria

Applying bibliometric techniques on the data nalysed from Science Citation Index for the years 1968 to 1977, it was found that the Le Pichon's well known article published in 1968 in the Journal of Geophysical Research proved 'infectious' and spread the new idea on sea-floor throughout the world. The article received in all 593 citations during this period and followed a well defined epidemic pattern, receiving maximum citations in the year 1970 and getting slowly stabilized in the year 1974.

NTRODUCTION

Bibliographic studies of subject literatures help in organising the library and information resources and planning of more efficient and effective ibrary and information services. Numerous studies have been conducted applying one of the ollowing bibliometric techniques individually or in combination of one or two:

1. the Bradford's technique of identifying the most productive journals, monographs, authors and publishers etc.
2. Price's technique for determining the research front of a subject by analysing references cited in the journal articles;
3. the Goffman-Kessler bibliographic coupling technique which provides a more logical approach to subject classification than direct matching procedures; and
4. Goffman's model of literature growth which derives from the analogy between the spread of infectious diseases and the spread of ideas.

Donohue in his recent book has demonstrated he application of all these techniques by analysing he literature of information science [1]. Principal approach used in this study for analysing the litera-ure of Geophysics is the epidemic theory of litera-ure growth as developed by Goffman [2]. The idea s derived from the analogy between the spread of infectious disease and the spread of ideas. There are well developed techniques for determining the size of infection, nature of infection, the direction of infection and thus predicting the epidemics. Ideas can be spread from person to person directly or indirectly by way of an intermediate host - through the literature. An idea has the potential for growth and reproduction. Certain ideas do follow an epidemic process. They are held by isolated individuals for a time, then become epidemic and finally either become stabilized or decline. Goffman [4] has applied epidemic theory to comprehensive bibliography of mast cell research.

An idea on Plate Tectonics in theoretical Geophysics attracted the attention of the scientists of the world throughout, during late 1960s. A new idea was propounded by Le Pichon in 1968 which revolutionised the well established concept of continental drift. The idea spread very fast throughout the world in all the directions and was perhaps examined by all those numerous scientists who were concerned with this kind of studies or studies of similar or related nature.

EPIDEMIC NATURE OF THE IDEA ON SEA-FLOOR SPREADING:

The article entitled "Sea-Floor spreading and Continental Drift" got published in the learned journal of Geophysics - Journal of Geophysical Research Volume 73, issue 12; p3661-3697. The article published by Xavier Le Pichon, drew the attention of a large number of scientists which is quite evident from the subsequent publication of letters to editors, editorials, discussions, articles, and review articles on this topic citing this paper. The citation data for this article and other articles of Le Pichon is presented in Table No. 1, as revealed in the Science Citation Index (1965-1977). The main objective of this study was to examine the epidemic nature of this idea of Plate Tectonics and Sea-Floor Spreading:

1. by tracing out the original paper of Le Pichon which is supposed to be infectious;

2. by determining the nature of actual epidemic i. e., the extent of the epidemic in terms of time and space; and

3. by finding out the current status of the epidemic.

CITATION ANALYSIS

Citation analysis technique was applied by making extensive use of Science Citation Index. As we know, the Index constitutes the largest citation data base for all science and technology, provides a good opportunity to conduct such a study. The data on the citations received by all the articles of Le Pichon, were collected by looking through all the volumes of SCI available in the University of Ibadan Library and the Library of International Institute of Tropical Agriculture. By looking up Le Pichon X in the Citation Index sections of the various volumes of SCI (cumulative Index, 1965-69, 1970-74, individual yearly cumulative volumes of 1975, 1976 and 1977), the data on all the citations received by the author for all of his papers were collected. The data showing the number of articles published in a particular year and cited during a specific year or period, the number of citations received by these articles etc. are presented in the Table No. 1. For example, Le Pichon's 15 articles published in 1968 were cited 115 times during the period of 1965-69. and, in all, his 35 articles published during 1960-69, received 166 citations.

The data were further analysed looking critically again in the Citation Index volumes for the individual articles for their citation patterns. Three of his articles were identified, receiving maximum citations, consistently throughout this period. These articles have been marked or labelled for their identification and future reference as ARTICLE ONE (marked as * in the table), ARTICLE TWO (marked as ** in the table) and ARTICLE THREE (marked as + in the table). The details of these articles are given as below:

ARTICLE ONE (*) was published in 1965, ARTICLE TWO and ARTICLE THREE were published in 1968. All the three articles were published in the periodical, Journal of Geophysical Research. All the three articles were looked again in SCI for their citation patterns. The articles have been cited heavily by all kinds of documents such as, letters (L), Discussions (D), Editorials (E), Review articles (R), Notes (N) etc. The data for these articles is presented separately in Table No. 2 indicating the details of number of citations received by them individually for each year, and the kinds of publications received by them individually for each year, and the kinds of publications citing them. Their status among all the articles of Le Pichon is indicated by calculating the percentages of their citations and this data is presented in Table No 3. Looking generally, and as well as examining the data presented in table No. 1, 2, and 3, one can easily identify that the article three (+) published in 1968 in the Journal of Geophysical Research (vol. 73) was most heavily cited. Therefore, it was thought necessary to analyse the citation data of this article in more detail. Year to year citations for this article were counted, kinds of various publications citing the article were noted. The analysis of this data is presented in table No. 4, 5, 6.

INFECTIOUS IDEA

On examining the citation data presented in table 1, one can notice that Le Pichon has published a large number of papers during the period of 1960-77. A majority of his articles have been cited by the various authors in a variety of forms of literature. All of his papers published during this period received in all as many as 1513 citations. Le Pichon's first article was of 1960 which was cited by a few authors and received consistent citations even upto 1977. Perhaps, Le Pichon did not publish anything in the years 1961, 1962, and 1963. Even his publication of 1964, was not very much cited, as it received in all 4 citations with no citations during 1976 and 1977. But one of his articles of 1965 (ARTICLE ONE) has been very consistently cited, receiving in all 65 citations upto 1977. This article "Crustal structure of the mid-ocean ridge - 1. Seismic refraction measurement" by Lepichon, X and others, published in the leading journal of geophysics, Journal of Geophysical Research (vol. 70, issue No. 2; p 319-339) is the first to generate the interest in the author, his team and other scientists to think and work in this new direction. This article can be said to be generic in its nature for developing further ideas in the direction of new thinking, but could not be said as infectious. Other two articles are of 1968. Out of which one, article two(**) seems to be very important as evident from the citation pattern, indicating consistancy of citations upto 1977 and being cited as many as 122 times, but cannot be classified as infectious if one compares the citation pattern of the other publication of 1968. ARTICLE THREE (+), "See-Floor Spreading and Continental Drift" published in the Journal of Geophysical Research, Volume No. 73, issue No. 12, page 3661-3697, which has received the maximum citations, 593 out of 1513 of all the citations Le Pichon has received for all his publications so far. The article thus receiving 39.2% of all the citations could be identified easily, containing the most potential idea to become infectious.

EPIDEMIC NATURE OF INFECTIOUS IDEA

To further examine the nature of the infectious idea the data were analysed in detail, and the results of the analysis are given in Tables No. 4, 5, and 6. The citations for year to year from 1968 to 1977 are given in Table No. 4 and graphically represented in the Fig. No. 1. The citation pattern very clearly indicates the potential of the idea to become infectious and which became highly infectious during

TABLE I: CITATIONS RECEIVED BY LEPICHON DURING THE PERIOD 1965-1977

Year of the articles cited	Period during articles were cited		Period during articles were cited		Year during articles were cited		Year during articles were cited		Year during articles were cited		Total citations
YEARS	1965 - 1969		1970 - 1974		1975		1976		1977		
YEARS	I	II	I	II	I	II	I	II	I	II	
1960	1	1	3	9	-	-	2	3	1	2	15
1961	-	-	-	-	-	-	-	-	-	-	-
1962	-	-	-	-	-	-	-	-	-	-	-
1963	-	-	-	-	-	-	-	-	-	-	-
1964	1	1	1	2	1	1	-	-	-	-	4
1965	2*	25	2*	26	1*	3	1*	9	1*	2	65
1966	7	9	2	2	-	-	-	-	1	1	12
1967	2	2	3	4	1	1	-	-	-	-	7
1968	15+	115	27+**	560	7+**	49	6+**	52	6+**	45+**	821
1969	7	13	7	62	3	5	5	8	2	5	93
1970			12	30	2	3	2	3	5	7	42
1971			30	164	14	45	12	54	18	53	316
1972			5	9	5	6	1	2	-	-	17
1973			1	4	8	22	8	33	10	33	92
1974			4	14	2	2	3	3	1	1	20
1975					1	1	1	1	1	1	3
1976							2	2	2	2	4
1977									1	2	2
TOTAL	35	166	97	886	45	137	43	170	49	154	1513

I No. of articles cited during the year/period
II No. of citations received during the year/period

* ARTICLE ONE
** ARTICLE TWO
+ ARTICLE THREE

TABLE 2: CITATION DATA FOR THREE MOST CITED ARTICLES

Articles cited	1965-69	1970-74	1975	1976	1977	Total
ARTICLE ONE (*) J Gephys Res. 70(2); 319- ; 1965	24 IR; 3L	25 IR	3 IR	9 2R	4	65 5R; 3L
ARTICLE TWO(**) J Gephys Res. 73; 2101- ; 1968	35 IR; 9L	74 3R	3 3R	4 IR	6 1N	122 8R; 9L 1N
ARTICLE THREE(+)	67 13L; 4N	417 19R;5L; 2E; 3D; 17N;	38 7R	41 2R	30 3R;IL	593 31R; 19L; 2E;3D 21N;

TABLE 3: DISTRIBUTION OF CITATIONS AMONG VARIOUS ITEMS

Item	No. of citations	%	Cum. %
Article one(*)	65	4. 3	4. 3
Article Two(**)	122	8. 1	12. 4
Article Three(+)	593	39. 2	51. 6
other items	733	48. 4	100. 00
Total	1513	100. 0	100. 0

TABLE 4: CITATIONS RECEIVED BY ARTICLE THREE

(Published in Journal of Geophysical Research;
Vol. 73; Issue. No. 12; p 3661-3697; 1968)

Year during article is cited	No. of citations received	%	cumulation	Cumulative %
1968	6	01. 01	6	01. 01
1969	61	10. 29	67	11. 30
1970	107	18. 04	174	29. 34
1971	101	17. 03	275	46. 37
1972	94	15. 85	369	62. 22
1973	73	12. 31	442	74. 54
1974	42	7. 08	484	81. 62
1975	38	6. 42	522	88. 03
1976	41	6. 91	563	94. 94
1977	30	5. 06	593	100. 00
TOTAL	593	100. 00	593	100. 00

TABLE 5: FORMS OF PUBLICATIONS CITING ARTICLE THREE

Year of citation	Articles A	Editorials E	Letters L	Discussions D	Notes N	Reviews R	Total T
1968	4	-	2	-	-	-	6
1969	46	-	11	-	4	-	61
1970	96	-	2	1	5	3	107
1971	90	2	-	1	3	5	101
1972	80	-	2	1	7	4	94
1973	68	-	1	-	1	3	73
1974	37	-	-	-	1	4	42
1975	31	-	-	-	-	7	38
1976	39	-	-	-	-	2	41
1977	26	-	1	-	-	3	30
TOTAL	517	2	19	3	21	31	593

Table 6: PERCENTAGE DISTRIBUTION OF CITING ITEMS

Items	No.	%
Articles (A)	517	87.3
Reviews (R)	31	5.2
Notes (N)	21	3.5
Letters (L)	19	3.3
Discussions (D)	3	.5
Editorials (E)	2	.3
TOTAL	593	100.00

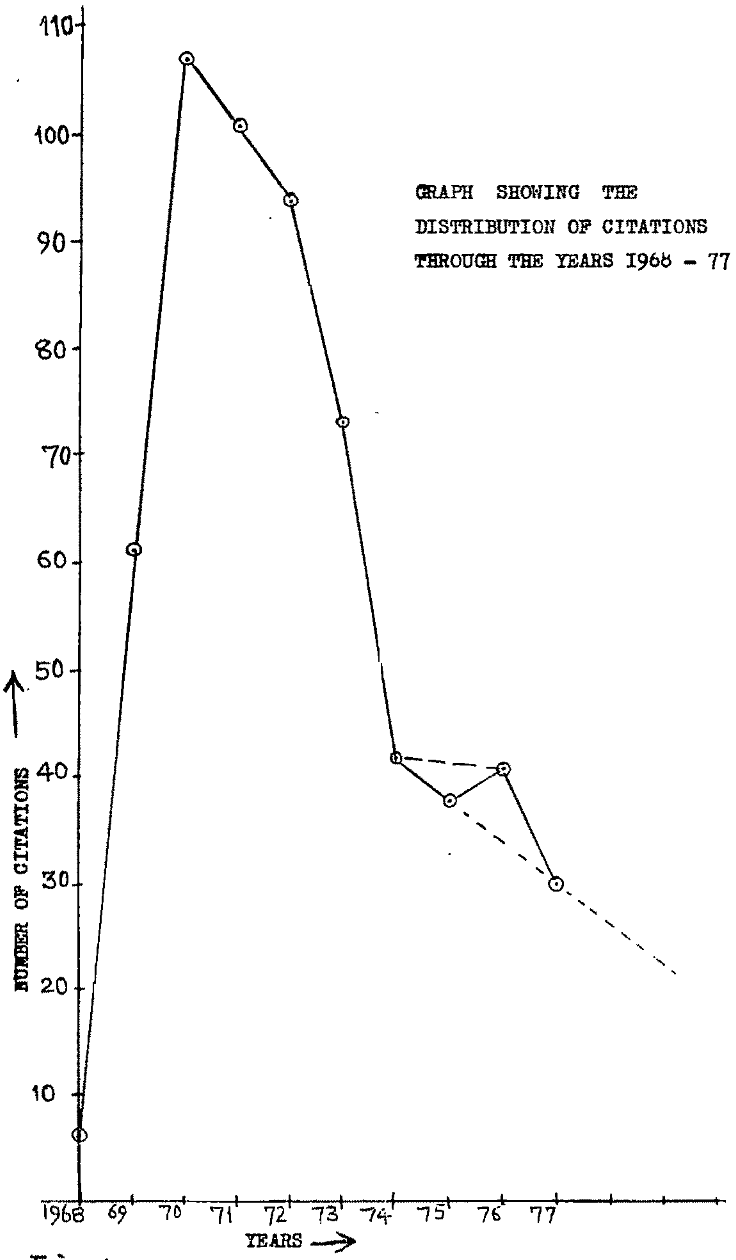
GRAPH SHOWING THE DISTRIBUTION OF CITATIONS THROUGH THE YEARS 1968 - 77

Fig. 1.

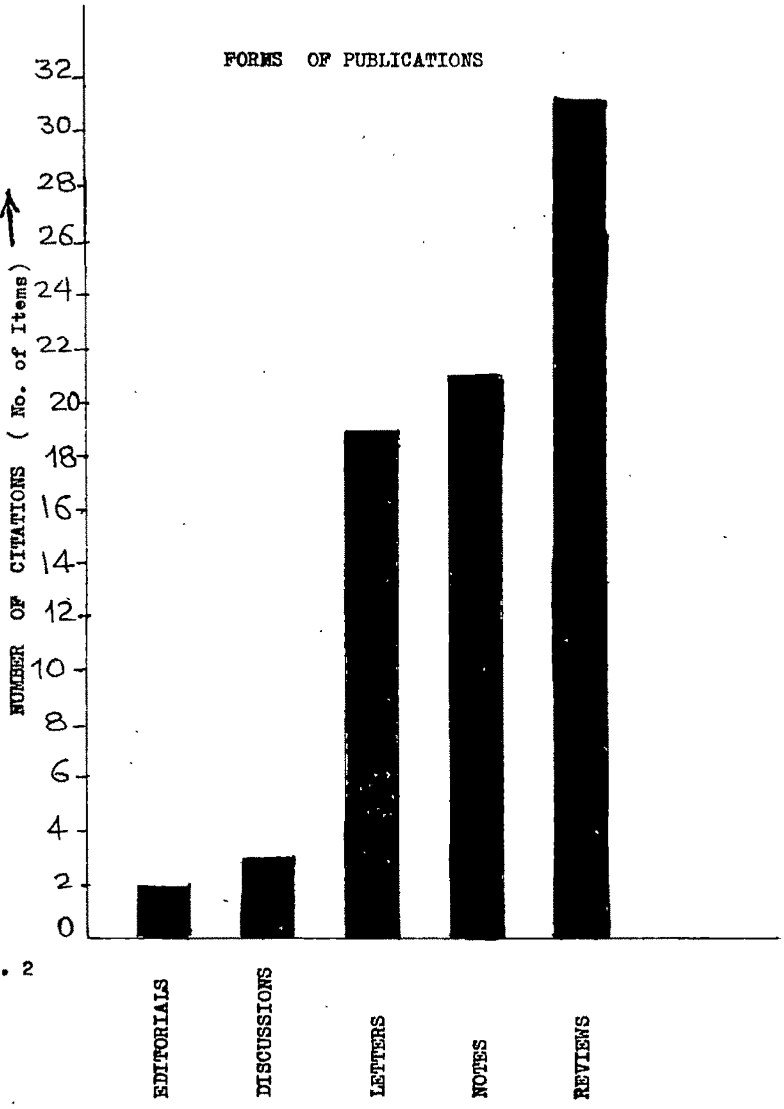

FIG. 2

the years 1970 and 1971. During these years, the article was cited 107 and 101 times respectively, in a variety of documents originating from several countries. The idea, thus, had spread in all directions throughout the world, very quickly. The idea got stabilized in the normal way, during the years 1974, 1975, and 1976 having received an average of 40 citations for these years (42, 38, and 41 respectively). It shows a declining trend towards the year 1977 which also seems to be quite a normal phenomena but still needs confirmation after examining the data of the subsequent years to come.

Quite interesting results are found when the data are examined for the kinds of publications which have cited this article. The results are shown in the Fig. No. 2 and in Tables No. 5 and 6. Articles in periodicals take the first place, 517 citing items out of 593 i. e., 87.3% of all the items - quite a usual and normal channel of carrying the scientific idea. The review articles come next in order, taking 31 or 5.2% of all the citing items, which is quite a large and significant figure. Another interesting observation is that the idea has taken a very natural and normal course of spreading. In the first instance, it was cited in a very informal manner in the letters, notes and discussions etc, during the years 1968, 1969, and 1970. During the peak of its infection, it was cited by two of the editorials in 1971. Later, during all the other years of its spreading, when it got widely spread and subsequently stabilized, the papers have been cited mostly by the review articles and other formalized and specialised media of scientific communication.

CONCLUSIONS

593 different citations appeared in 69 different periodicals and other publications of various countries in the world, the citation patterns, spreading trend of the idea through informal and formal media, quite evidently establish the epidemic nature of the idea. This new idea of Plate Tectonics, having its genesis in 1965, originated in 1968 was definitely of epidemic nature, created a revolution among the geoscientists throughout the world. The idea spread so quickly that it infected a large population all around the world during a very short span of only five years, having its maximum influence in the years 1970 and 1971, getting stabilized through the years 1974-76, and showing a slight decline in the year, 1977.

There are areas in the library and information services, where the findings of this study could be applied to obtain better results. Resources and services could be organized in more efficient manner, specially for the scientists who are working on the problems of plate tectonics or on related aspects The study has further encouraged to examine the nature of the publications which have cited this epidemic idea which might be quite useful to the documentalists, librarians and geoscientists.

I wish to thank Dr. W.C. Aiyapeku, who has inspired and encouraged me to take up such a study.

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DESIGNING A COMPUTERISED CATALOGUE USING COBOL

ASHOK SADHU
BHEL Library,
Delhi

Reports the results of an experiment conducted at BHEL, Delhi Library with E.C. 1020. Using COBOL language for creating a machine readable bibliographic data base

Computers are presently being used for a variety of library operations like procurement, processing, charging etc. but most crucial is the creation of the bibliographic data base on magnetic tapes and generation of the printed catalogues with its various desired indexes. A program using Cobol language for creating a machine readable bibliographic data base has been developed using E.C. 1020.

The purpose of this program is to create a machine readable bibliographic data base and generate the printed catalogues in a book form with supplements at intervals or thoroughly new updated catalogue. In addition a number of specific purpose indexes to data fields can be created.

1 SYSTEMS OVERVIEW

Figure I gives the systems overview for creating a machine readable bibliographic data base.

The System can be said to comprise of the following operations:-

1 - Data preparation & input
2 - Transferring input on to magnetic tapes
3 - Sorting the file created at (2) in the desired sequence using the manufacturer's software.
4 - Output obtained in a definite desired order in the printed form or on magnetic tapes or both as the case may be.

In this system, after records are checked, the data is transferred from punched cards to the tape thereby creating a file called Main File and in this file the records are transcribed in the same sequential order in which the records are fed to the computer. The system provides for getting the print out directly from the Main file in the desired sequence (Classified, Author & Title), or generating the sorted files on magnetic tapes for future use.

While updating, the new records can be separately put on the magnetic tape. The previous records on tape and the records on the new tape are merged to create a master tape, and then desired printout can be obtained or alternatively the tape containing the new records is used to generate the Author, Title and Classified Sequence Files, on magnetic tapes separately and these files can be merged with the corresponding files already available on tapes and desired output obtained in printed form.

2 DATA STRUCTURE & ORGANISATION

The first step in the creation of any computerised data base is that the data has to be stored in a machine readable form with prior definition of data structure as precisely as possible for the machine to process. This implies the description of the fields, records and files.

The basic constituents for a data structure are fields. The field is the location in which a given kind of data is stored.

The set of fields constitute a record.

The set of records together constitutes a file.

2.1 Input/Output Files

In the system the following files have been used:

		File Name	Medium
2.1.1	Input File	CARD FILE	PUNCH CARDS
2.1.2	Output Files	MAIN FILE	MAGNETIC TAPE
		PRINT FILE	LINE PRINTER
		SORT FILE	DISC
		M-FILE	MAGNETIC TAPE

3 CARD FILE

The card file is the input file. The input entries are prepared by punching data on a standard 80 column punch cards.

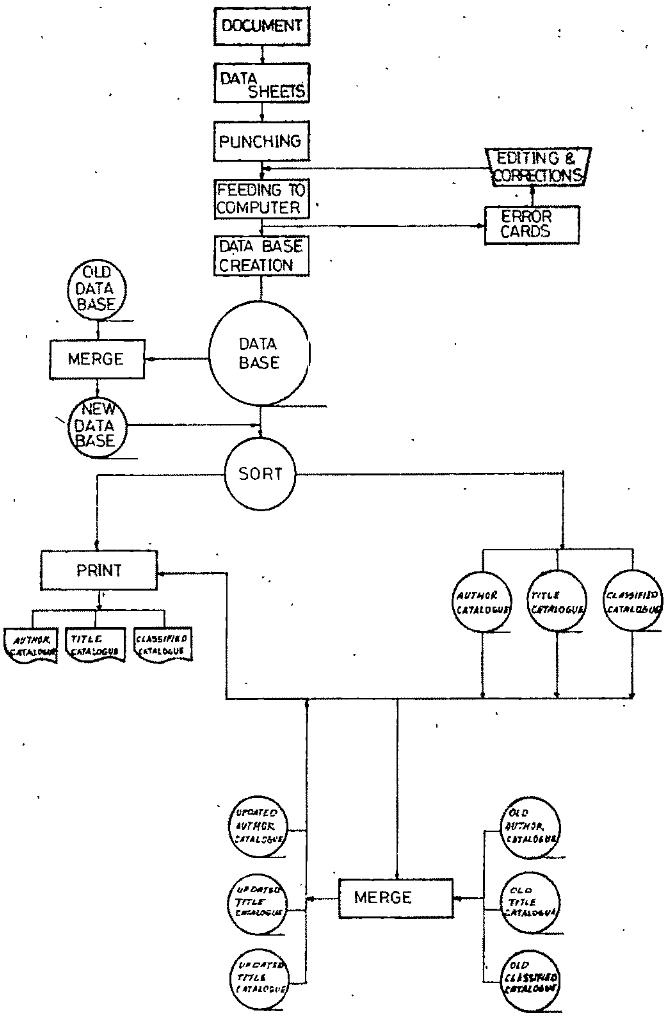


FIG. I SYSTEMS OVERVIEW

RECORD FORMAT

While punching data on the punch card, we can either have fixed or variable record format. In this system we have used - fixed format variable field record structure. The maximum length of each field is provided but there is no minimum limit. The use of the magnetic tape for the Main File has made it possible to use such a flexible format.

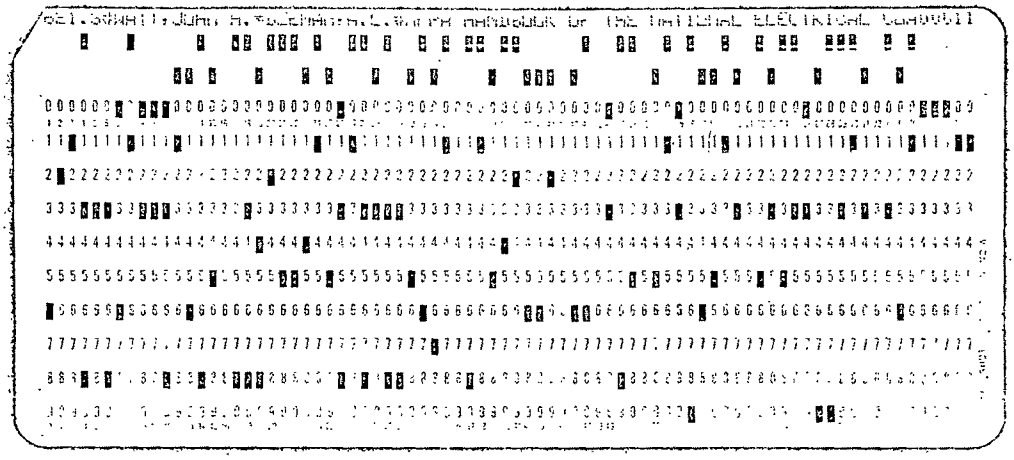
In contrast fixed field format though simple for computer processing provides a rigid structrue and results in wastage of punch cards. In this type of format the length of the field has either to be such so as to be able to accommodate the largest value or large values have to be truncated to the maximum length provided and when field values are less than the maximum length, the remaining position of the field are left unfilled, thus resulting in the wastage of the punch cards. In catalogue data, we know that the length of the same field in different records is quite varying, hence to save the unfilled space the fixed format variable field structure is appropriate. The use of variable fields, allows the format to fit the actual data.

In punching the input data, a catalogue entry (record) can have a maximum of four punched cards. The number of characters in an entry (record) varies with each document. Hence the data is punched continuously in columns 1 to 74 using continuation cards when required and col. 75 to 79 are used for punching an alphanumeric document number and Col. 80 is used for punching the serial number of the card for a record. Each field is separated by a field separator or the end of the field symbol " ⧺ " and end of the record is indicated by the end of the record Sign " $ ". In case the document has two authors a symbol "   " is punched immediately at the end of the first author and at the beginning of the second author, as shown in the Figure III. The maximum number of characters for each entry is subject to the upper limit of 296 characters. The maximum limit of characters for each field is as shown in the "record format", whereas there is no limit for the minimum of the characters for each field.

A format for a record is shown in Figure II.

S. No.	FIELD	DATA	TOTAL		CARD NO.
1	1-15	Class No.	15		1
2	15-74	Author (S)		71	1
3	75-79	Record No.	5		1
4	80	Card No.	1		1
5	1-12	Author (S)			2
6	13-74	Title		120	2
7	75-79	Record No.	5		2
8	80	Card No.	1		2
9	1-58	Title			
10	59-74	Imprint		90	3
11	75-79	Record No.	5		3
12	80	Card No.	1		3
13	1-74	Imprint			
14	75-79	Record No.	5		4
15	80	Card No.	1		4

Fig. II RECORD FORMAT



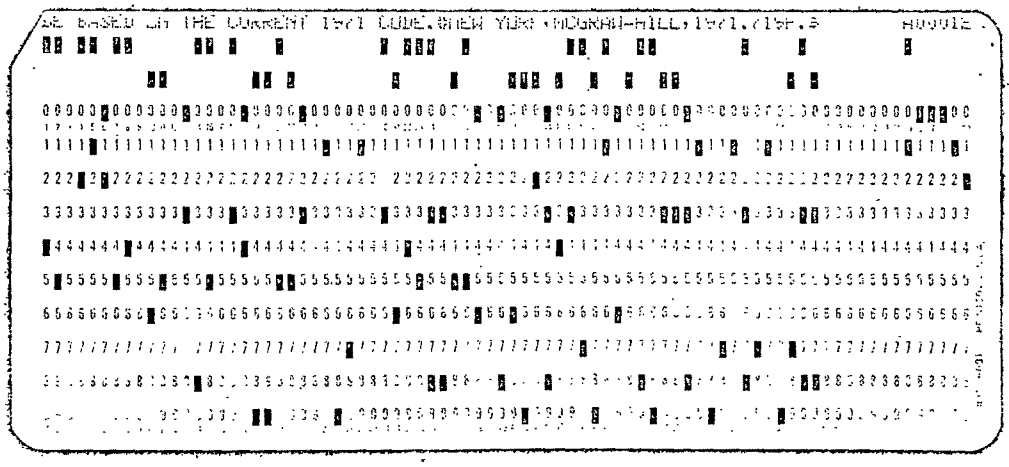

BASED ON THE CURRENT 1971 CODE.NEW YORK.MCGRAW-HILL,1971.(15P.$
H0001E

FIG. III INPUT PUNCH CARDS

6 OUTPUT FILES

The file named "Main File" is a file on the magnetic tape and is an intermediate file which is ultimately used in obtaining the final printed outputs or the outputs on the magnetic tapes. The print files are obtained from this Main File by using the manufacturer's software for sort and three printed sequences are obtainted viz. (a) Classified sequence (b) Author sequence (c) Title sequence. Apart from getting the output in printed form the same can be got on the magnetic tapes if desired and the file name for the same is M-File. Whereas S-File is the auxiliary sort file, which does sorting operation in the desired sequence on the discs. The use of the disc is made to have the quick sort operations.

The use of Main File on the magnetic tape as master or intermediate file is essential since the multiple cards are used for a single record and field length is not fixed. Data in each record are transferred to the magnetic tape (Main File) with the specified field descriptions provided in the data division of the Cobol Program. Data is transferred to the Main File in the blocked form. These blocks are the physical record and these are also, of course, the logical records. It is desirable that these have a degree of organisation on the tapes, Figure IV shows the organisation of the tape files in our program for machine readable bibliographical data base.

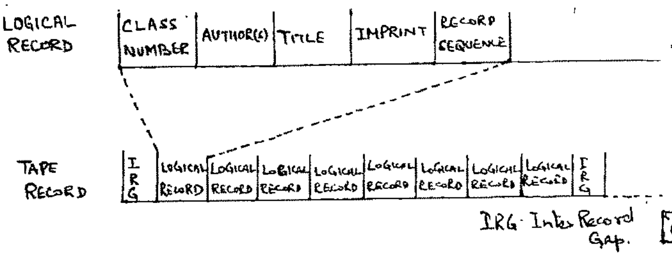


FIG. IV MAGNETIC TAPE FILE FORMAT

As described in the systems flow chart that once the data stored in the magnetic tape either as Main file or as sorted file (M-file) for future use, the punched cards can be destroved, since the processing of data is very fast when on magnetic tapes and the volume of storage space required is considerably very less when data is loaded on the magnetic tape. A 2400 - feet reel has an approximate storage capacity of 52 million characters but actual capacity depends upon the system and tape density. But the entire reel cannot be used to load the data due to the necessity to stop the tapes between blocks of data that are small enough to be read into computer memory. After the block is read the tape gets stopped. To allow sufficient time to deal with the next block, some space known as IRG (Inter Record Gap) is left. But this provision of space creates the wastage of magnetic tapes. To minimise the wastage of tape space we have designed the file structure with 8 records per block, as shown in Fig. IV.

7 THE PROGRAM

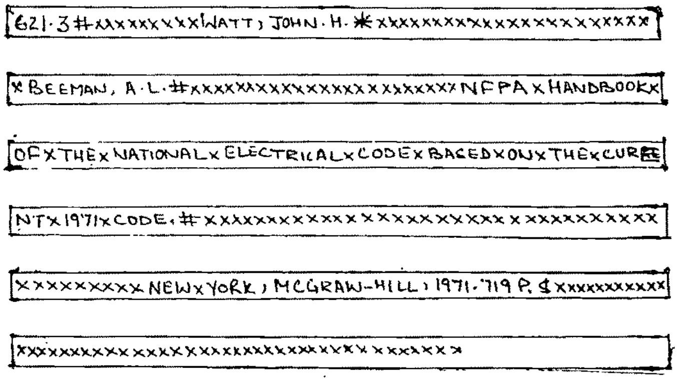
A brief program flow chart is given in Fig. VI which is self-explanatory. The program operations are as follows:

First operation after reading the input file on cards, what the computer executes is checking the record sequence and card sequence within the record. Since multiple numbers of punch cards per record have been used and there is a possibility that 2nd or the subsequent card of record A may get mixed up with 2nd card or the subsequent card of record B or alternatively intermediate punch cards of a record may be missing or misplaced. In case there is an error in record sequence or card sequence within a record, it prints out the error message and rejects that particular record and goes to read the next record.

After checking the sequence the next operation is checking of the each field for the maximum length provided for and in case the input data exceeds its maximum length it prints out the error message with record and rejects the record and passes on to the next record.

All the correct records get written on the magnetic tape creating the file called Main File, the records with errors are taken out, edited and corrected and inserted in the Main File with help of separate merge and update program.

Now the Main-File is just a card image of the input cards on tape. The position of data when transfeered from punched cards on to tape (Main File) is as shown in Fig. V.



```
621·3#xxxxxxxxxWATT, JOHN.H.*xxxxxxxxxxxxxxxxxxxxxx
xBEEMAN, A.L.#xxxxxxxxxxxxxxxxxxxxxxxxxxNFPAxHANDBOOKx
OFxTHExNATIONALxELECTRICALxCODExBACEDxONxTHExCURRE
NTx1971xCODE,#xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
xxxxxxxxxxNEWxYORK, MCGRAW-HILL, 1971.719 P.$xxxxxxxxxx
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

Symbol X: Used for Space

Fig V - MAIN FILE

This Main File on the magnetic tape is now the file for generating the various desired outputs. In the next step the program calls the manufacturer' software for sort and sorts the records in the Main

File in author sequence. The print program does the last job, i.e., the printing of hard copy of the desired sorted files. It puts each record in a pre-determined format. This takes the longest time

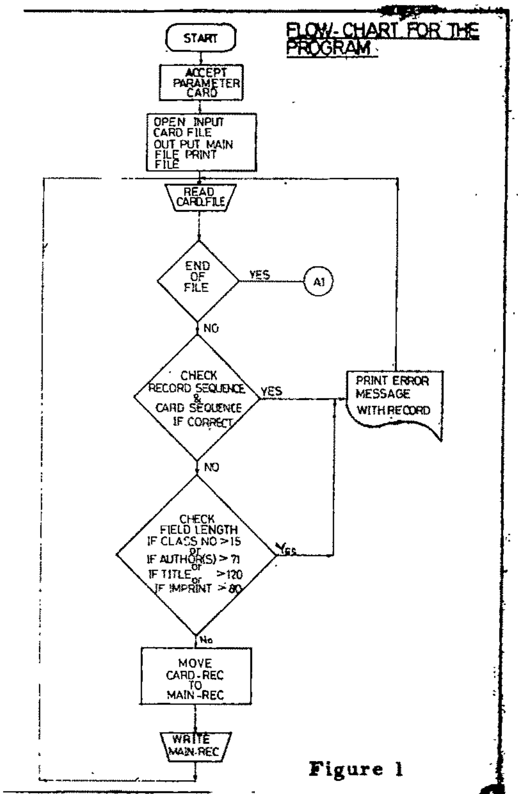

FLOW-CHART FOR THE PROGRAM.
START
ACCEPT PARAMETER CARD
OPEN INPUT CARD FILE OUT PUT MAIN FILE PRINT FILE
READ CARD.FILE
END OF FILE
YES
A1
NO
CHECK RECORD SEQUENCE & CARD SEQUENCE IF CORRECT
YES
PRINT ERROR MESSAGE WITH RECORD
NO
CHECK FIELD LENGTH IF CLASS NO >15 or IF AUTHOR(S) > 71 or IF TITLE >120 or IF IMPRINT >80
Yes
No
MOVE CARD-REC TO MAIN-REC
WRITE MAIN-REC

Figure 1

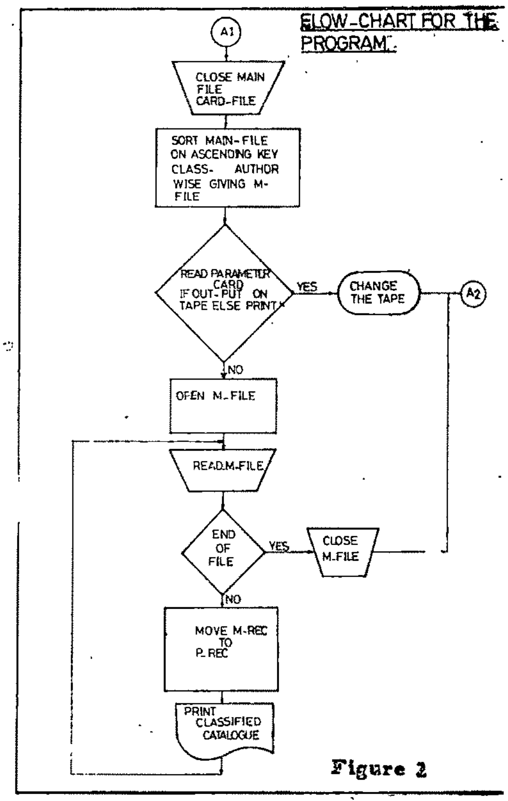

A1
FLOW-CHART FOR THE PROGRAM.
CLOSE MAIN FILE CARD-FILE
SORT MAIN-FILE ON ASCENDING KEY CLASS- AUTHOR WISE GIVING M-FILE
READ PARAMETER CARD IF OUT-PUT ON TAPE ELSE PRINT
YES
CHANGE THE TAPE
A2
NO
OPEN M-FILE
READ.M-FILE
END OF FILE
YES
CLOSE M.FILE
NO
MOVE M-REC TO P.REC
PRINT CLASSIFIED CATALOGUE

Figure 2

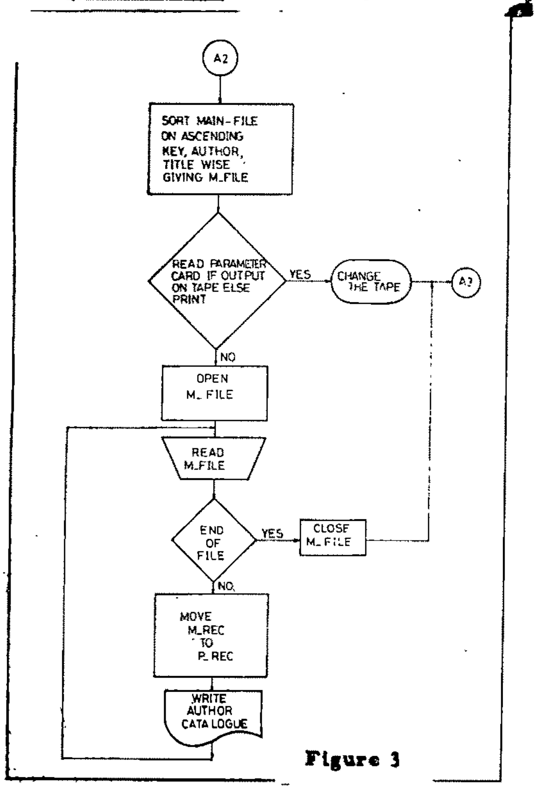


Figure 3

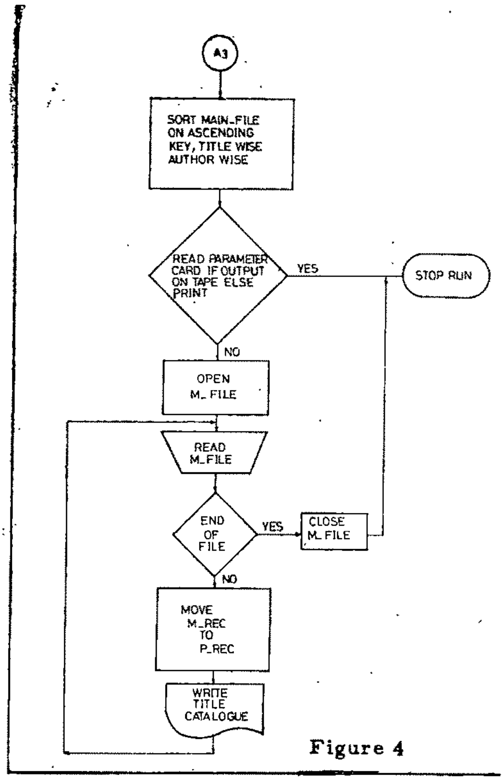


Figure 4

JOURNAL ACQUISITION AND COST-EFFECTIVENESS IN A SPECIAL LIBRARY: A CASE STUDY

K.S. RAGHAVAN

Deptt. of Library Science,
University of Madras, Madras-600005.

Brookes' Model, based on traditional Bradford's approach, as a quantification method, has some loopholes which can be overcome by ranking journals considering both productivity and subscription cost. This paper reports such a study. The major findings are 1) This method is a further improvement and rationalisation of Brookes' method and traditional Bradford's approach. 2) There is a steady decrease in the value of Rupee in terms of yield of relevant papers and thus journal acquisition reaches the point of diminishing returns at a certain stage. 3) There is a significant difference in the two ranked lists.

0 INTRODUCTION

The modern library cannot be certainly operated as though it were a passive repository of printed material. The modern library is a complex system to manage where the opposing requirements of comprehensiveness and selectivity can be balanced only by an application of the techniques of Statistics, Operation Research and Management rather than by intuition and experiences. The pressures of growth of publication are forcing librarians to think more quantitatively about their libraries than most of them ever have before. The major advantage in putting a quantitative value to library procedures is that the operating decisions could be based on explicit analysis and quantitative data rather than on past practices and a desire to simulate other libraries. Decisions based on properly collected quantitative data would be more rational than decisions based on intuition and experience.

Quantification techniques are particularly applicable to periodicals as the scientific periodical literature has been found to obey Bradford's distribution. Several quantification models based on Bradford's law of scattering are available for use in journal selection programmes. In a recent study(1) Brookes model(2) was applied to journals subscribed to by the Central Food Technological Research Institute Library (Mysore, India). The major finding of the study was that there could be substantial reduction in the cost of providing access to relevant journal literature in a special library.

The traditional Bradford method of ranking journals is based on the single unit of the number of relevant papers in the journal. No attempt is made to make the ranking more objective by relating the relevant items to the cost of acquiring the journal. Instead, it is presumed that subscription is the same, for all journals. Hence the method could be improved upon and further rationalised to arrive at a more realistic picture as suggested by Robertson and Hensman(3). The major conclusion in the above mentioned study was that 'Ignoring cost factors is likely to lead to a bad decision in cost effectiveness terms'. It is the objective of the present study to make such a cost effectiveness study and compare it with the findings of the earlier study.

1 Unit of cost and unit of effectiveness

The unit of effectiveness for any journal in a given context (C F T R I, in this case) is the relevant items obtained by scanning the journal. This will have to be so untill we can perfect methods to measure the yield of benefit resulting from the relevant items in a journal. This is certainly something more than a mere measurement of the number of uses to which a journal is put (although at present we seem to accept this generally). The unit of cost would be the subscription cost to the journal (plus scanning, handling and maintenance costs). In this study the unit of cost is modified to include only the cost of subscription excluding the overhead cost of scanning, maintenance, etc., because it was found to be difficult to associate a realistic overhead cost figure with each journal and also because the study by Robertson and Hensman (referred to earlier) had established that overhead cost had little, if any, effect on the final results.

2 Method of collecting data

The foremost thing for the present study was to assess the relevancy of papers appearing in the journals subscribed to by the CFTRI Library. This was a simple job as a panel of specialists regularly scan every journal received in the Library to mark relevant articles for inclusion in the 'Documentation List' and 'Food Technology Abstracts', two local current awareness services. The period selected for the purpose of the study was the year 1975, for this provided the most recent and convenient period. For each journal, the total number of relevant items published in 1975 was computed and this figure was divided by the subscription cost of that journal to yield a measure of relevant items per unit cost for that journal which was used to rank the journals. A graph was drawn with cumulated subscription cost on the X axis and cumulated sum of relevant papers on the Y axis. (Appendix).

3 Analysis and Findings

3.1 The cost of acquiring 50%, 75%, and 90% of the journal literature is tabulated and is as given below:

Percentage Coverage	50%	75%	90%
Cost in Rs.	9,000	28,000	54,000

It is evident from the above table that in order to acquire 50% of the literature presently acquired, the library is required to spend as little as Rs. 9,000/-, which is less than 10% of the present expenditure on periodicals. This clearly establishes the fact that it is often not desirable for any library to try to cover the complete journal literature in the field by subscribing to journals. A more economical and desirable approach would be to cover a good percentage of literature through subscriptions and acquiring the remaining literature through subscription to journals and getting the remaining literature as photocopies is as below:

Total Savings	=	Present expenditure on journals	-	Cost of Subscription to the journals which together yield 75% of the literature	+	Cost of photocopies of remaining 25% of the literature

= (1, 25, 789) - (28, 000 + 13, 720)

= Rs. 84, 069 (Approx).

Against this, the cost of acquiring journals which together yield 75% of the total literature according to original Bradford ranking and Brookes' Method was calculated. It was found to cost Rs 68, 200 (Approx). Thus, the total savings according to this method of ranking is,

= Rs. 43, 800 (Approx)

The above two figures of savings substantiate the view that journals cannot be considered from the point of 'Yield' alone, but, 'Yield' in terms of 'investment'. Thus, the second method is a further improvement and rationalisation of the Brookes' Method and traditional Bradford's approach.

3.2 The increase in the yield of relevant papers for each additional investment of Rs. 10, 000 is tabulated below:

Cost in Rs.	Number of Net Papers
10, 000	1400
20, 000	1540
30, 000	2100
40, 000	2280
50, 000	2440
60, 000	2535
70, 000	2585
90, 000	2680
100, 000	2715
115, 000	2737
125, 000	2745

The investment of first Rs. 10, 000 can buy as much as 1400 relavant papers (i.e. 50%) where as the investment of the last Rs. 10, 000 can buy only 8 relevant papers (i.e. 0.3%). This clearly shows that there is a steady decrease in the value of Rupee in terms of yield of relevant papers.

The graph shows that beyond a certain point t the curve runs almost parallel to the X axis. This means that at a certain stage acquisition of journals in a given discipline or in a given context reaches the point of diminishing returns.

3.3 A study of the two Ranked lists (one ranked according to absolute productivity and the other productivity in terms of investment) indicates a significant difference in the ranks of individual titles. The journal 'Biophysica Acta' which ranked very high in first ranked very low (Rank No. 123) in the second. Another journal 'Bakers Digest' featuring low in the earlier list, featured high in the later list. This was the case with many other journals too.

Given below is a table of percentage of coverage, incurring cost of subscription, cost of photocopies, and net savings:

Percentage of Coverage	Cost of Subscription in Rs.	Cost of Photocopies	Net Savings
50%	9,500	27,440	88,850
75%	28,000	13,720	84,069
90%	54,000	5,480	66,300

3.4 The table proves that the 'Model' is flexible to suit any requirements both in terms of money as well as literature coverage. Thus, the 'Graph' and the 'Ranked List' can be efficiently adapted in decision making in the given context. The 'Graph' and 'Ranked List' are useful in arriving at decisions, regarding:

1. What is the minimum cost of obtaining a certain percentage or relevant journal literature?

2. What is the maximum yield of relevant papers obtainable for a given statement of Library budget for periodicals?

3.5 After making decisions regarding acquisition of journals based on the above findings a continous assessment of the desirability of continuing subscription to a given journal could be made by a cost benefit study (The number of uses to which a journal is put per unit cost).

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MAINTENANCE OF PERIODICALS COLLECTION: A STATISTICAL CASE STUDY

R.C.GUPTA, N.JAYARAMAN
KRISHANLAL and C.C.RAVINDRAN
Structural Engineering Research Centre
Roorkee (U.P.)

Results of a study carried out to ascertain the active life of periodicals in structural engineering after taking into consideration the aging factor, obsolescence factor, half life, mean life and utility factor on the basis of citations in periodicals are presented in this paper. The periodical, 'Journal of the Structural Division' of the American Society of Civil Engineers, New York, 1974 has been taken for the study. The paper concludes that the periodicals in structural engineering lose their utility value after 8 years (approx.) of their publication.

INTRODUCTION

Periodical is a generally accepted term that denotes a publication of which each volume is made up of distinct and independent contributions, not forming a continuous exposition normally by two or more personal authors and normally the specific subjects and the authors of the contributions in successive volumes also being in general, different, but all the subjects falling within one and the same region of knowledge, contemplated to be brought within its purview. It is not usually released complete as a volume but only in fascicules or numbers, as they are called. It essentially expounds the knowledge and does not repeat the same kind of information, usually in the same pattern, in each of its volumes just bringing the information up-to-date from volume to volume [11].

The importance of the periodical publications increases as the necessity for going deep, pinpointed and uptodate knowledge increases. These publications are the life and blood of a research scholar. The library staff has multifocal problems in maintaining these publications. The users may require at one instance a very old periodical and on the other hand a recent one. The laws of Library Science call for the satisfaction of the users, and side by side a caution to keep the library collection under control.

In both the cases (contradictory to each other apparently)the library has to frame such a policy that may justify each of the addition or deletion (withdrawal or rejection). Apart from the space requirements for the accumulated collection that goes on increasing every year, the library has to justify for the expenditures on preparatory expenses (binding, treating it against insects, damp, or fire), maintenances(dusting, handling, etc.). In case a reproduction is suggested, the reproduction cost and handling expenses are to be justified. Meeting out the demand of the majority of the users the library has to come at certain decisions to frame the library maintenance policy. The statistical principles may be applied to solve this problem and help in reaching certain agreeable decisions. Bradford's Law of Dispersion has been applied by Brooks and others in various subject fields to ascertain the maximum life of a periodical being used actively in a library [1-10]

SCOPE AND OBJECTIVE

The study was aimed at suggesting a way for the maintenance of periodicals in structural engineering on the basis of their active life that was calculated after ascertaining aging factor, obsolescence factor, half life, mean life and utility factors on the basis of citations in periodicals. The study is helpful in maintaining the periodicals (back volumes) to a period of their active use economically. After the active life the back volume may be weeded out for a least loss to their potential users.

METHODOLOGY

The most helpful method in the determination of the life of a document, periodicals in particular, is the analysis of its citations over a span of time. The analysis is done using the statistical method of collection of data and applying distribution pattern as devised by Brooks and Line [1,8]. The methodology used here for the analysis is similar to the studies already carried out by Ravichandra Rao in the field of Radio Engineering and Sociology [9,10].

SOURCE

The data for the analysis have been collected from the periodical 'Journal of the Structural Division, American Society of Civil Engineers, Vol. 100, 1974'.

ANALYSIS

The field of Engineering, that too Structural Engineering, is a fast growing subject and was recognised during the late 19th century as a basic discipline, and hence most of the authors came into the field during 1900-1930s. Their basic works are often referred to, but as it is growing at a fast rate and new theories are formed updating the old obsolete theories, the study here reveals that there are very little chances to refer far back.

PATTERN OF DISTRIBUTION

The data collected for the study revealed that the citations were referred back upto 1930.

Frequency Polygon: Actual frequency polygon has been drawn to show the citation number at a glance (See Fig. 1).

Semi-logarithmic Curve: The logarithmic curve was drawn using the cumulative frequencies of citations (See Fig. 2).

Data: The data on years, citations and cumulative frequencies are given in Table 1.

ANNUAL AGING FACTOR

The annual aging factor (a) has been calculated graphically using the procedure suggested by Brooks [4, 5]. Figure 2 gives the semilogarithmic curve for the data, 1930 to 1974 for Journal of the Structural Division, American Society of Civil Engineers, Vol. 100, 1974. The straight line AB drawn parallel to the linearity of the plotted graph is the semilogarithmic graph of $T(t) = a^t$. $T(t)$ is the citation tail - that is, the cumulative frequency of the articles cited to the t^{th} year.

where $t = 1$, $T(1) = a$

The annual aging factor can be estimated from this relation where 'a' is the annual aging factor and 't' is the period in years.

The relationship between citationship tail and year is given by

$$T(t) = a^t \quad \text{when } t = 0 \quad T(0) = 1$$
$$t = 1 \quad T(1) = a$$

the value of 'a' determined from the graph, in Fig. 2, is

$$T(1) = a = 0.89$$

Now for $t = 20$, $T(20) = a^{20}$

From Fig. 2 the value of $T(20) = .066$, so

$$a^{20} = .066$$
$$\log a = 1/20 \log .066$$

This gives Annual aging factor (a) = 0.873 (i)

OBSOLESCENCE FACTOR

The obsolescence factor (α) has been calculated following the procedure suggested by Line [8] from the relation

$$\alpha = (0.5)^{1/m} \qquad \text{(ii)}$$

where 'm' is the mean life

MEAN LIFE

The mean life (m) of the distribution can be obtained from the annual aging factor (a) using the following relationship

$$1/m = \log_e 1/a$$
$$\therefore \; 1/m = \log_e 1/0.873$$
$$= \log_e 1.45 = 0.1354$$
$$m = 7.407$$

Substituting the value of the 'm' in Eq. (ii) we get

$$\alpha = (0.5)^{1/7.4}$$
$$\text{Log}_{\alpha} = 1/7.4 \; \log (.5)$$
$$\doteq \frac{\bar{1}.6990}{7.4}$$
$$= \bar{1}.9593$$
$$\alpha = .91$$

HALF LIFE

Line [8] has defined half life (h) and it can be determined from the graph such that the relation $a^h = 1/2$ will hold good.

$\therefore$ From Equation (i) $(0.873)^h = 0.5$

$$h = \frac{\log 0.5}{\log 0.873} = \frac{\bar{1}.6990}{\bar{1}.9410}$$
$$= \frac{(-.301)}{(-.059)} = \frac{301}{59}$$
$$= 5.1 \qquad \text{(v)}$$

Half life = 5.1 years

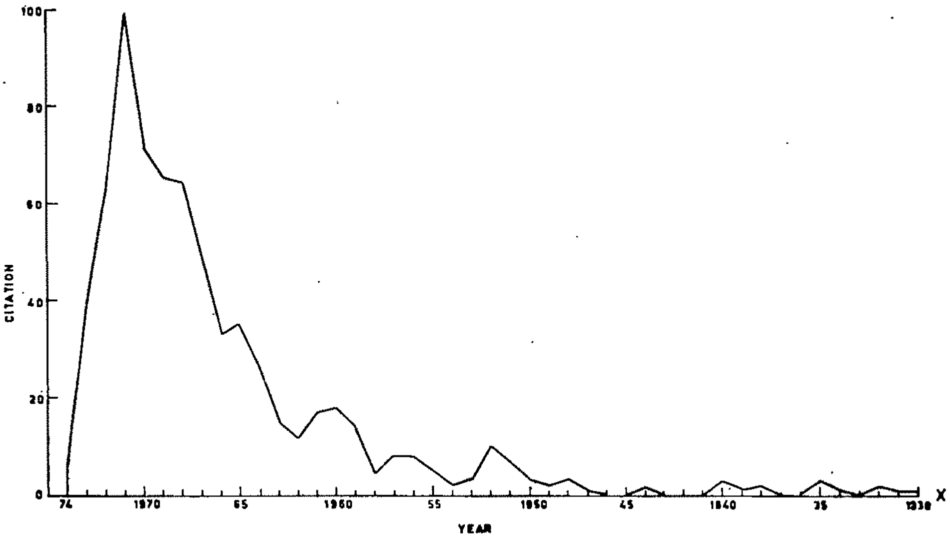

FIG. 1 FREQUENCY POLYGON OF CITATION JOURNAL OF STRUCTURAL DIVISION (ASCE) V 100;1974

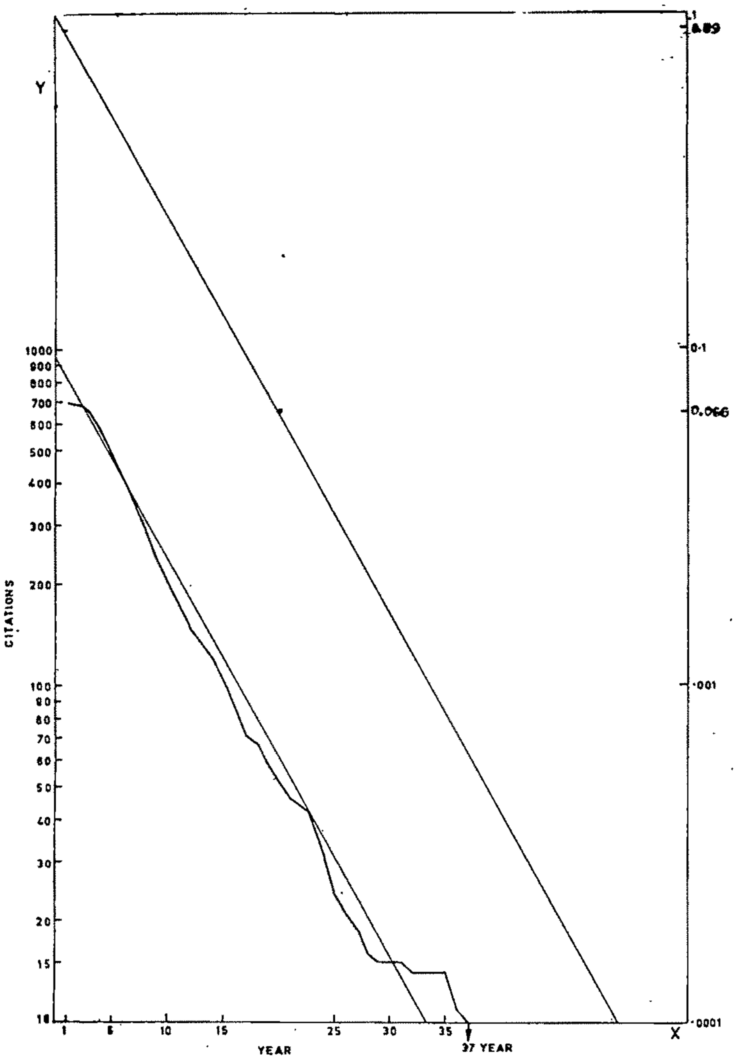

FIG. 2 SEMILOGRITHMIC GRAPH T (t) AND a^t (LOG SCALE) AGAINST t (LINEAR SCALE) FOR CITATION DATA OF TABLE 1

CITATION DATA (FROM JOURNAL OF THE STRUCTURAL DIVISION (ASCE) (M) 100, 1974)

Year	Citation	Cumulative frequency	Year	Citations	Cumulative frequency
1974	6	698	1952	10	41
1973	41	692	1951	7	31
1972	63	651	1950	3	24
1971	99	588	1949	2	21
1970	71	489	1948	3	10
1969	65	418	1947	1	16
1968	64	353	1946	0	15
1967	48	289	1945	0	15
1966	33	241	1944	1	15
1965	35	208	1943	0	14
1964	26	173	1942	0	14
1963	15	147	1941	0	14
1962	12	132	1940	3	14
1961	17	120	1939	1	11
1960	18	103	1938	2	10
1959	14	85	1937	0	8
1958	4	71	1936	0	8
1957	8	67	1935	3	8
1956	8	59	1934	1	5
1955	5	51	1933	0	4
1954	2	46	1932	2	4
1953	3	44	1931	1	2
			1930	1	1

CONCLUSIONS

From the study it is found that the periodicals on Structural Engineering lose their utility value after approximately 8 years, whereas their half life comes to 6 years and have a steep decline towards obsolescence after 15 years of their publication. Upto 15 years a library may maintain its bound volumes (90% of use will be over by that time). Economically, strong libraries may have bound volumes upto 8 years and then may turn to microform from 8 years to 20 years. After 20 years (after 97% use) these publications may be withdrawn from the library and transferred to the dormitory for occasional reference if need arises. The results have been compared with the data collected for the same periodical for the year 1976 and found correct.

UTILITY FACTOR

The utility factor (u) can be calculated using the relationship

$$u = \frac{1}{1 - a}$$

$$u = \frac{1}{1 - 0.873} = \frac{1}{.127} = 7.875 \qquad \text{(vi)}$$

So utility factor is 7.875.

ACKNOWLEDGEMENT

Authors are thankful to the Director, Structural Engineering Research Centre, Roorkee, for permission to publish the paper.

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FUNGAL ATTACK ON BOOKS: A REPORT

G.J.NARAYANA, H.G.DESAI
and Mrs. L.JOSEPH

Institute of Armament Technology,
Girinagar, Pune-411 025.

Advantages & disadvantages of various methods of control of fungus attack on books have been described. Results of thymol sterilisation tried during 1976 monsoon period in the Institute of Armament Technology Library have been presented. It has been inferred that proper design of the library building and good ventilation, area sterilisation with 10% thymol in methyl alcohol at an interval of 20 days during monsoon check the growth of fungus.

Books in libraries in India are prone to fungal attack during the monsoon season. Damage caused is just nominal in some libraries, quite serious in a few and unaffected in many others. Even within a city the damage differs from library to library and from year to year. This account refers to fungal attack on books in Pune. In fact, this problem was not there till two or three years back in Pune.

Fungal attack on books was not noticeable in the library of the Institute till 1973-74. In the year 1975, it errupted during the monsoon season i.e. between June to September. Almost 10 to 15% of the collection both books and bound journals were severely attacked by fungus. The damage to the wrappers, particularly spine, was wide spread. In quite many cases the defacing was of such an extent that nothing printed on the spine could be read. However, it was found that the nearby Central Water and Power Research Station Library, having same environment as the Institute was more or less free from fungal attack. The remedial measure taken in 1975 was to wipe out the fungus with cloth, but this did not prove to be very effective. The problem was studied in greater detail in the year 1976 and more effective control measures were taken.

Climatic conditions surrounding the library are given in Table 1.

National Archives of India (1) has reported that fungal micro-organisms grow very slowly at low temperature, 4.5°C. (40°F) and rapidly at optimum temperatures, 27-35°C (80-95°F) differing with different species, and also that the growth is checked at temperature and relative humidity (RH) in the range of 22-24°C (72-75°F) and 45-55% respectively. Wessel (2) in a comprehensive account of the subject has quoted that a RH of below 70% to provide little opportunity for growth of fungi and that maintenance of RH at 60-65% or lower will control the growth of these micro-organisms. Large variations in these figures are probably due to complex environmental and climatic conditions prevailing in different geographic regions and also the criteria used in fixing safe limits.

There is a direct relationship between RH and temperature: Hence, any desired control measure has to take this into consideration. Wessel has also emphasised the need for holding temperature and RH at fairly constant or within narrow range which precludes sudden rises of RH or even condensation of water. Thus any effective fungus control measure centers round the control of climatic factors and or micro-organism itself. Thus the problem consists of controlling:

a) Temperature
b) Water vapour; and
c) Micro-organisms.

The ideal solution for controlling temperature and water vapour is to aircondition the stack rooms if not the whole library. Given the financial limitations airconditioning is out of consideration for most of the libraries in the country.

Since room temperature above the range 35 to 38°C (100°F) checks the growth of fungi, an effective step to inhibit fungus growth is to raise the temperature of stack rooms. While considering to raise the room temperature we have also to think of human comfort. Malhotra (3) has experimentally worked out the comfort temperature for Indian conditions at 22°C (75°F) and places the limits between 22°C to 25.6°C (71.6°F to 78°F) depending on the season. Raman (4) has reported that in Bombay in the months of February through November the atmospheric temperature is beyond

Table 1 : Temperature and Relative Humidity during 1976 monsoon period

		Relative Humidity in %			Temperature in Centigrade.		
Area	Month	Min.	Max.	Ave.	Min.	Max.	Ave.
PUNE	JUNE	51	91	71.48	20.10	35.90	26.44
	JULY	53	97	80.83	20.30	31.70	25.20
	AUGUST	66	95	80.98	21.00	29.40	24.45
	SEPTEMBER	66	95	79.51	20.30	28.80	24.35
CWPRS	JUNE	66	100	85.68	21.10	32.80	26.38
	JULY	76	100	89.83	20.60	29.40	24.68
	AUGUST	80	100	99.10	21.70	29.40	24.54
	SEPTEMBER	65	100	92.01	19.40	32.20	24.80
INSTITUTE LIBRARY	JUNE	63	84	70.88	23.89	28.89	26.85
	JULY	71	89	82.70	22.22	25.56	24.40
	AUGUST	68	89	82.20	22.78	27.28	24.58
	SEPTEMBER	71	89	80.46	22.78	26.10	24.61

the range of comfort. Temperature to be raised to bring down the RH to safe levels is given in Table 2.

Some libraries in the country, including the University of Bombay, try to prevent the fungus growth by the use of heaters during the monsoon season. Cost consideration of using heaters have not been worked out. Apart from the difficulty of maintaining a uniform temperature throughout the day, the more serious problem encountered is that of its adverse effect on the paper. It has been reported by the Bombay University Library (5) that due to evaporation of moisture the paper, particularly of old books, becomes brittle. Years of exposure to uncontrolled heat will ultimately destroy the book

The temperature and moisture content inside the room is dependent on the circulation of air within and without. Proper circulation of air is said to retard the growth of these micro-organisms. National Archives of India has recommended air control with the help of electric fans. Though it helps to some extent, it will not completely eliminate the growth of fungus.

Lowering of moisture content by dehumidification of air by the use of fresh anhydrous calcium chloride or silica gel, to control fungus growth is recommended by the National Archives of India and also by Plumbe (6). The disadvantages of this method are that the entry of out-side moist air into the library needs to be checked by keeping windows permanently closed during the whole of monsoon

Table 2 : Required temperature to reduce RH to safe limits

Room temperature		Corresponding RH	Temperature to be raised to reduce RH to			
Dry bulb	Wet bulb		65%	60%	55%	50%
23.3°C (74°F)	22.2°C (72°F)	89%	28.5°C (83.3°F)	30.0°C (86°F)	31.5°C (88.7°F)	33.0°C (91.4°F)
20.0°C (68°F)	20.0°C (68°F)	100%	26.8°C (80.3°F)	28.0°C (82.4°F)	29.5°C (85.1°F)	31.5°C (88.7°F)

season, and the dehumidification agents need recycling at least once a week. Hence, dehumidification of this type is not suitable except for small areas.

Moisture in the environment affects the relative humidity. Seepage of water in the rainy season through windows, doors and walls have been thought to be additional factors encouraging the growth of fungi. Coating of walls and roofing with anti-fungal paints is likely to block this source of fungal growth.

Except air conditioning all the other measures described above, have the disadvantage of their inability to maintain the climatic conditions either constant throughout the season or within the suitable narrow range. Hence chemical control of micro-bacteria has great merit. Plumbe (6) has quoted that coating of books with anti-fungus varnish containing selloc, mercuric chloride and camphor or thymol, mercuric chloride, ether and benzene has been tried out as a solution to fungus problem in many libraries. But it is very cumbersome to coat thousands of books with varnish. He has also cited that the presence of minute traces of acetaldehyde or ammonia in the storage atmosphere is said to completely inhibit fungal growth. Hence a general method of chemical treatment rather than dealing with individual book, deserves serious consideration. Sterlization of the room by spraying 10% solution of thymol (para-di-chloro benzene) in methylated spirit is said to check the growth of spores present in small rooms. Results of thymol sterilization tried during 1976 monsoon period in the library of the Institute are discussed below:

Books on the stacks of the library were observed daily for visible symptoms of fungus growth from Ist June. About 15 books taken out from the stack were kept in a separate room within the library to serve as control group. Through out the study period dry and wet bulb (d. b. and w. b.) temperatures and relative humidity, both inside the stack and outside the building, were recorded daily at 0800 Hrs and 1330 Hrs. The first sight of fungus growth was noticed on the 6th of June; the growth was found only on 20 to 25 books out of a collection of about 15,000 books. These books were in three different racks housed wide-apart. In the first week of June, there was beavy rain fall for about 3 days, the result of a cyclonic storm. These bobks and also the spines of all books on other shelves were cleaned daily with cloth. This was followed by the first sterilization. A 10% solution of thymol in methyl alcohol was sprayed with the help of a hand spray-pump along the length and height of the racks. The books were kept in this atmosphere for about 38 hours. About 250 to 300 c.c. of the solution was used for a shelf area of 25 x 6 sq.m.

Growth of fungus was also found on 2 books in the control group just about the same time. These were only cleaned with cloth and no thymbol treatment was given.

The next fumigation was given after about 25 days in the first week of July at the commencement of rainy season. This was followed by 4 more sprays at an interval of about 20 days. The books were kept in the fumigated atmosphere for 12 to 15 hours. The final fumigation was given in the last week of September which coincided with the last phase of the rainy season. This has achieved almost complete check of fungal growth as observed by the naked eye; exception being 10 to 12 books which were still susceptible to fungal attack.

In the control group the fungus not only reappeared on the 2 books which were cleaned with cloth but was found to spread to other nearby books

The fungus was indentified to belong to the genus of Asperigallus.

The damage consisted of development of spots, spread of these spots into thin layers of fungus, eating away the starchy material of the rexin and finally defacement of print on the spine. Generally the growth of fugus started with the edges and spread to surfaces all along. It appears that the attack is greatly influenced by the type of rexin used for binding and its chemical composition. Though it was possible to identify black and light green coloured rexin with shining back ground to attract the fungus growth more than other colours, it is probably due to chemical ingredients of the rexin than of the colour. It also confirmed the findings of earlier workers that books tightly shelved are more prone to fungus growth than those loosely shelved; thus confirming the need for proper air flow. In all the cases the fungus was found to affect only the binding and not the paper.

The problem has been to :

1 Identify the reasons for the sudden widespread eruption of fungus in 1975 and onwards though the books were housed in the same place since 1967; and to

2 Account for the fungal growth in the library of the Institute and not in CWPRS though both have more or less same temperature and relative humidity.

The design and location of the library building seems to be responsible for fungus eruption, in that the library of the Institute:

1 Is an open building, thus receiving direct rain all along the walls on all sides;

2 Gets inadequate circulation of air and;

3 Ceiling and wall areas become damp in the rainy season due to seepage of water from the ceiling joints.

The above reasons may explain the growth of fungus in the Institute library and not in CWPRS, but they still do not account for the sudden occurrence of fungus in 1975.

In conclusion, it is inferred that proper design of the library building and good ventilation plays an important part in avoiding the growth of fungus. Area sterlization with 10% thymol in methyl alcohol at an interval of 20 days during the monsoon season checks the growth of fungus. Probably a more effective control of fungus attack could be achieved by adding suitable anti-fungal agents into the binding materials such as rexin, thread, gum and glue at the time of their manufacture. Manufacturing and standard bodies can play a major role in this direction. On the climatic control in libraries not much research has been done in the country. There is scope for micrometeorological studies in selected locations to help us understand the problem in depth. Also, the effect of minute traces of ammonia or acetaldehyde on the growth of fungi deserves study. Use of antifungal transparent paper or plastic jackets could also be tried.

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AGRICULTURAL INFORMATION NETWORK IN INDIA

SURENDAR MOHAN
INSDOC, Delhi-110012

Traces the historical development of agricultural research institutes and their libraries in India. Surveys the world output of agricultural literature and enumerates the Indian indexing and abstracting services in agricultural sciences. Works out a model for the National agricultural information network.

1 BACKGROUND

Present day agricultural research does not limit itself to the techniques of farming alone; it has broadened its scope to embrace both basic and applied sciences involved with the production of food, and materials for shelter and clothing as well as with the improvement of plants and animals and their protection and conservation. The other related areas are marketing and distribution of agricultural produce and socio-economic problems of farmers. Agricultural sciences mainly include plant sciences, forestry, animal husbandry, fisheries and marine products. With the alarming rate of growth in population, results of agricultural research are being put into widespread use for maximising production. At present over 3000 scientific institutes, universities, colleges and agricultural experiment stations are engaged in R & D work in the field of agriculture in the world [9].

2 AGRICULTURAL RESEARCH AND EDUCATIONAL COMPLEX IN INDIA

Scientific agriculture began to receive attention in India with the establishment of Imperial Department of Agriculture (Calcutta) in 1881 and followed by the emergence of State Departments of Agriculture in Bombay, Madras, Shillong, Allahabad and Nagpur between 1883 and 1895. The Indian Veterinary Research Institute, Izatnagar with one division at Mukteswar made its modest beginning as Imperial Bacteriology Laboratory at Poona in 1893. However, it was in the beginning of this century that the Government of India recognised the need for the establishment of a sound system and laid the foundation of organized research in India in 1905 by establishing the Agricultural Research Station and the Experimental Farm (Later called the Imperial Institute of Agricultural Research and still later, after independence, the Indian Agricultural Research Institute). Imperial (now Indian) Council of Agricultural Research was established in 1929 as a Registered Society. A number of Central Commodity Committees dealing with research in respect of particular crops were set up between 1921 and 1962 as semi-autonomous bodies and were located in the main growing regions of the crops concerned. Further the Government of India also established under their direct administrative control a number of Research Institutes such as the Central Rice Research Institute, Cuttack (1946), the Forest Research Institute and Colleges, Dehra Dun (1906), the National Dairy Research Institute, Karnal(1922), the Central Potato Research Institute, Simla (1949) etc. [6]. Similarly, the State Governments also set up their own Research Institutes and Experimental Research Farms. There are a number of other research institutions, such as Tea, Coffee and Rubber Boards, Central Food Technological Research Institute, the Botanical and Zoological Surveys of India, conducting research in agriculture or connected subjects. Indian agricultural research was reorganised in 1966 and as a result 33 research institutions are functioning at present under the auspicies of the Indian Council of Agricultural Research. There are also 21 agricultural universities and 73 agricultural-and 24 veterinary colleges in different states. Various institutes and universities have their sub-stations and farms. Different States have their own directorates in agriculture, extension, marketing and inspection. There is also an International Crops Research Institute for the Semi Arid Tropics at Hyderabad. In addition, the country has huge complexes of the Government of India like Fertilizer Corporation, Food Corporation and National Seed Corporation, etc. There are similar other complexes in private sectors also.

3 AGRICULTURAL LIBRARIES IN INDIA

The history of agricultural libraries in India is the history of agricultural research and training institutions. The ICAR institutes, agricultural universities, agricultural and veterinary colleges, and state departments of agriculture have their own libraries and have collections of varying sizes. Some of these libraries over the years have enlarged their collection, equipment, facilities and services. For example, the libraries of The Indian Agricultural Research Institute, The Indian Veterinary Research Institute and The National Dairy Research Institute are known for their rich collection in their respective areas in agricultural sciences. The Indian Council of Agricultural Research organized two survey teams in 1957 and 1967, to study the library and documentation activities in agricultural libraries. The report of the second survey which was published in 1969 carried valuable recommendations directed toward evolving a national system of agricultural libraries and documentation centres, with the libraries of The Indian Agricultural Research Institute, The Indian Veterinary Research Institute, and the National Dairy Research Institute functioning as national libraries in agriculture, veterinary and dairy science respectively. The report revealed that ICAR libraries have over 620,000 volumes and 9,832 current serials with them. Agricultural Universities in the country have over 780,000 volumes and 11,392 current serials. However these libraries do not follow any uniform practice in cataloguing and classification. [7]

4 QUANTUM OF AGRICULTURE LITERATURE

The estimates of the world output of agricultural literature vary considerably. Boyle and Buntrock in their study, 'Survey of World Agricultural Documentation Services', mentioned a total of 1,769,000 items as reported in 354 secondary periodicals taken together [3]. However, this figure represents multiple reporting of the same item of information in different secondary services. It has been estimated that over 25,000 books and monographs are published each year in agro-biological sciences [9]. In addition, various agricultural experiment stations, university and research institutes, all over the world publish 900-1000 bulletin series. Scientific reports and theses account for a good deal of literature and their importance is well recognised. The 'World List of Scientific Periodicals' lists about 60,000 titles of which around 15,000 serials are of interest to agricultural scientists. The Directory of Indian Scientific Periodicals brought out by INSDOC in 1976 has reported 308 agricultural periodicals published in India [5]. Various estimates have been made about the annual output of scientific contributions made in periodicals and they range from one to three million articles. Saxena has reported 1,200,000 articles published in 15,000 periodicals published in the field of agricultural sciences [14]. According to Anderala, the presently available estimation on the volume of information are on the lower side [1]. Further to the stock of published information must be added unpublished sources of information. According to Soviet estimates, more than 70% of information is unpublished. It is considered that the proportion of unpublished information in the field of agriculture is higher than the published information.

41 Abstracting and Indexing Services in Agricultural Sciences

Traditionally the literature of the sciences is "controlled" through indexes, reference lists (arranged in some useful order for current awareness) or abstracting services. Abstracting and indexing services play an important role in bringing information within the reach of its users and they serve as a principal access device to the existing information. Abstracting services, though slower, give more information for a comparatively deeper study. Numerous indexing and abstracting services have sprung up all over the world. They are diverse in scope, uneven in coverage, and national or international in character. Boyle and Buntrock in their survey have categorised 124 indexing (29 computerized) and 230 abstracting (45 computerized) services published from 41 countries and in 21 languages [3]. To reduce the time lag between primary and secondary publications more and more abstracting and indexing services are employing computers to speed up the production of their publications. As a spin-off, important data bases are being built up in a format amenable to Selective Dissemination of Information (SDI) and to eventual rapid retrieval of retrospective data by mechanical searching. The most important international abstracting and indexing services in the field of agriculture in English language at present are: CAB Abstracts of the Commonwealth Agricultural Bureaux, U.K., Bibliography of Agriculture, Bio-Sciences Information Services of Biological Abstracts, Abstracts of the Information Retrieval Ltd., London and AGRINDEX of International Information System for the Agricultural Sciences & Technology (Agris). International services are by no means comprehensive and no country can afford to dispense with their national abstracting and indexing services. John Sherrod, until recently the Director of the U.S. National Agricultural Library, Washington made this frank statement at a meeting of South American Agricultural Librarians held in Buenos Aires in April 1972. "In recent years...it has been painfully clear to us that the magnitude of the information problem in agriculture, as in most areas of knowledge, has grown beyond the capacity of any one institution or country to handle effectively. We find ourselves in the embarrassing position of facing continually rising costs of system operation, while simultaneously handling, substantially smaller portions of the total information output" [15]. This statement is supplemented by a study made by Rajagopalan and others on the coverage of Indian literature in the CAB abstracts The study revealed that despite all efforts Indian agricultural literature is being reported only to an extent of 30-40% in CAB abstracts, though India is one of the member countries of the Commonwealth and is one of the financiers of the CAB abstracting services [13]. Similarly in another paper Rajagopalan et al. (1963) made a survey of the extent of inclusion of Indian documents in the field of agriculture, botany, anomal husbandry and zoology in Biological Abstracts as compared to its reporting in Bibliography of Scientific Publications of South East Asia. Only 13.9% of the documents were abstracted (in Biological Abstracts) in six to seven months and even after one year 50% of the documents were not abstracted. The studied only confirm the need for national abstracting and indexing services.[11].

411 National Abstracting and Indexing Services in Agriculture

At the national level the service has to be more comprehensive of the broad subject areas of interest with a bias towards the research needs of the country as a whole. At the institutional level, this service usually tends to be in the form of local documentation lists compiled basing the periodicals acquired in the library or documentation section. Some of the services emanating from Indian institutes and are of interest to agricultural scientist are given in appendix 1.

5 ROLE OF LIBRARIES AND INFORMATION CENTRES IN AGRICULTURE

51 ICAR's Role

Indian Council of Agricultural Research (ICAR) is supervising and developing the library and documentation facilities of agricultural research institutions in the country. In 1969, a plan was worked out to establish a national system of agricultural information with a National Agricultural Library at its centre. The library of the Indian Agricultural Research Institute (IARI), New Delhi, which is one of the oldest and biggest agricultural libraries of the country, might be designated as the National Agricultural Library and a network of agricultural libraries and documentation units may be knit together into a coherent agricultural information network in the country. At present the IARI library has a holding 260,000 volumes and receives about 4800 current serials annually and serves about 150 readers per day. Catalogue of Serials in the IARI Library brought in 1967 contains 5448 entries, which includes current & ceased serials [4]. The number will now be around 6,000. The library is building up Indian Bibliography of Agriculture(Indian) Agricultural Reference Media) since 1944. The bibliography contains about 100,000 references and is arranged in two parts:alphabetical part by author, and subject part in classified order according to Universal Decimal Classification Scheme. The subject part also contains added entries. The bibliography is being kept updated through the addition of about 8000 entires per year, prepared by scanning over 700 Indian and foreign periodicals for work done by Indian scientists relating to Indian agriculture.

ICAR has established in 1967 a current research information centre entitled Research Project Unit at its headquarters in Delhi on the model of Current Research Information System (CRIS) of US Department of Agriculture. The Unit is responsible for collection, collation, indexing and dissemination of information pertaining to all on-going agricultural research projects in India. Data pertaining to 7500 research projects involving 12,000 agricultural research workers in the country have been collected. ICAR is participating in the International Information System for the Agricultural Science, and Technology (AGRIS) since May 1975, and in the CARIS Project since September 1975. The Research Project Unit of ICAR is regularly sending input data to the AGRIS data base at Vienna. About 200 Indian journals besides the non-conventional types of literature, are scanned for the collection of input data.

Indian veterinary Research Institute libraries at Izatnagar and Mukteswar contain about 100,000 volumes and subscribe, to about 1000 serials in animal husbandry, veterinary and agricultural sciencies. At the Mukteswar Branch, a useful information file has been built up during 1905 to 1947. The file contains about 40,000 references on cards which are of immense value to veterinary scientists. National Dairy Research Institute, Karnal, has a valuable collection of about 45,000 bound volumes and subscribes to over 600 journals of interest to dairy scientists in the country.

52 Publications and Information Directorate and other CSIR Libraries

The Publications and Information Directorate (PID) of CSIR has been publishing an encyclopaedia entitled 'Wealth of India'. For this encyclopaedia an information file has been in preparation for over three decades. It has at present over 4, 000000 references which are filed under approx. 5000 subject headings comprising botanical names for plants, common names for animals, minerals and industries. Corresponding files of information (ledgers) have also been built with necessary photocopies, reprints etc. and at present they number about 5000. Currently it is screening 939 periodicals and serials and 450 annual reports besides 20 abstracting periodicals. About 25,000 references are added each year. The Documentation Section of the PID publishes quarterly 'Bulletin of Indian Raw Materials and Their Utilization' in two series since 1977. Series A deals with Current Literature on Medicinal and Aromatic Plants and Series B deals with Current Literature on Raw Materials other than Medicinal and Aromatic Plants. Over 200 Indian and foreign journals are scanned to choose titles of interest. Abstracts (about 1200 in a year) are also given along with these titles. The holdings of the libraries of CSIR laboratories and institutes are partly or wholly suited to the agricultural scientists. A 'Survey of the CSIR libraries', carried out by Rajagopalan and Ramaswami in 1970[12] reveals that the libraries of National Botanical Gardens (NBG), Central Indian Medicinal Plants Organisation (CIMPO), Central Food Technological Research Institute (CFTRI), and some other institutes contain considerable amount of literature of agricultural interest.

53 Directorate of Agricultural Economics & Statistics, N. Delhi

The Directorate is an important organisation which collects, collates and disseminates useful information on agricultural statistics in the country. The information is published in various publications brought out by the organisation. Important subjects covered by the Directorate are: Agricultural prices, agricultural wages, commercial crops, estimates of areas and production of principal crops, farm prices, food statistics, etc.

54 Libraries of Surveys of India

A wealth of information and literature is available at the Botanical Survey of India (BSI), Geological Survey of India (GSI) and Zoological Survey of India (ZSI).

55 Other Libraries and Information Centres

In addition to the above institutes and organisations agricultural information is also emanating from Central Ground Water Board (CGWB), Fertiliser Association of India (FAI), National Seed Corporation of India (NSCI), Pesticide Association of India (PAI), Agricultural Machinery Manufacture Association (AMMA), Directorate of Marketing and Inspection, Central Water and Power Commission, Bhabha Atomic Research Commission (BARC), various meteorology departments, etc. [8].

6 NISSAT

The Department of Science and Technology has included a proposal for the development of a National Information System for Science and Technology (NISSAT) in its programme of Science & Technology. It has been envisaged that this programme will lead to interlinking and coordination of a large number of information sources, systems and services into an effective network. This information network will function under an overall coordinating agency with a national information policy for guidance. This will be an important step toward meeting the information needs of, "scientists, engineers, technologists, management personnel and technicians, the government, the industry and business etc. at all levels in all varieties of organisation, projects and missions, efficiently and effectively with a minimum of duplication of efforts". It is also intended to recognize and identify the lacunae in information sources and services and to make effort to fill up these gaps. Another important feature of NISSAT would be the development of internally compatible national standards and guidelines for information handling techniques which will facilitate interchange of information. A sum of Rs. 1.6 crores has been allocated for the development of the NISSAT in the remaining period of the Fifth Plan. The present and the proposed national information centres would constitute the top level of organisation [10].

61 National Network

A network in information field means a systematic organisation of interconnected libraries, documentation and information centres for achieving greater economy and efficiency. Agricultural information network in India would therefore be a network of participation of three proposed national agricultural libraries namely IARI, IVRI and NDRI, other libraries of the ICAR, Agricultural Universities Libraries, and ICRISAT, and cooperation of libraries of the food, fertilizer and seed corporation, various commissions and surveys, libraries of CSIR complex, Coffee, Tea and Rubber boards etc. Diagram in appendix 2 represents the Agricultural Information Network in India. This network would form one sector of the NISSAT.

7 INTERNATIONAL COOPERATION

The exponential rate of growth of publication and information embodied in these publications has forced not only the developing but even the developed countries of the world to pool their information resources at the international level and the net result is the emergence of International Systems viz. International Nuclear Information System (INIS), International Information System for the Agricultural Sciences and Technology (AGRIS). As already stated in section 51, in the agriculture field, India is participating in AGRIS. FAO has also sponsored AGLINET, a world wide network consisting of a chain of eleven major agricultural libraries in several regions or countries of the world. AGLINET makes scientific and technical literature available through mutual exploitation of agricultural library resources. It also supports and monitors the work of AGRIS and promotes inter-regional co-ordination in the aquisition of serials avoiding duplication.

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Appendix 1

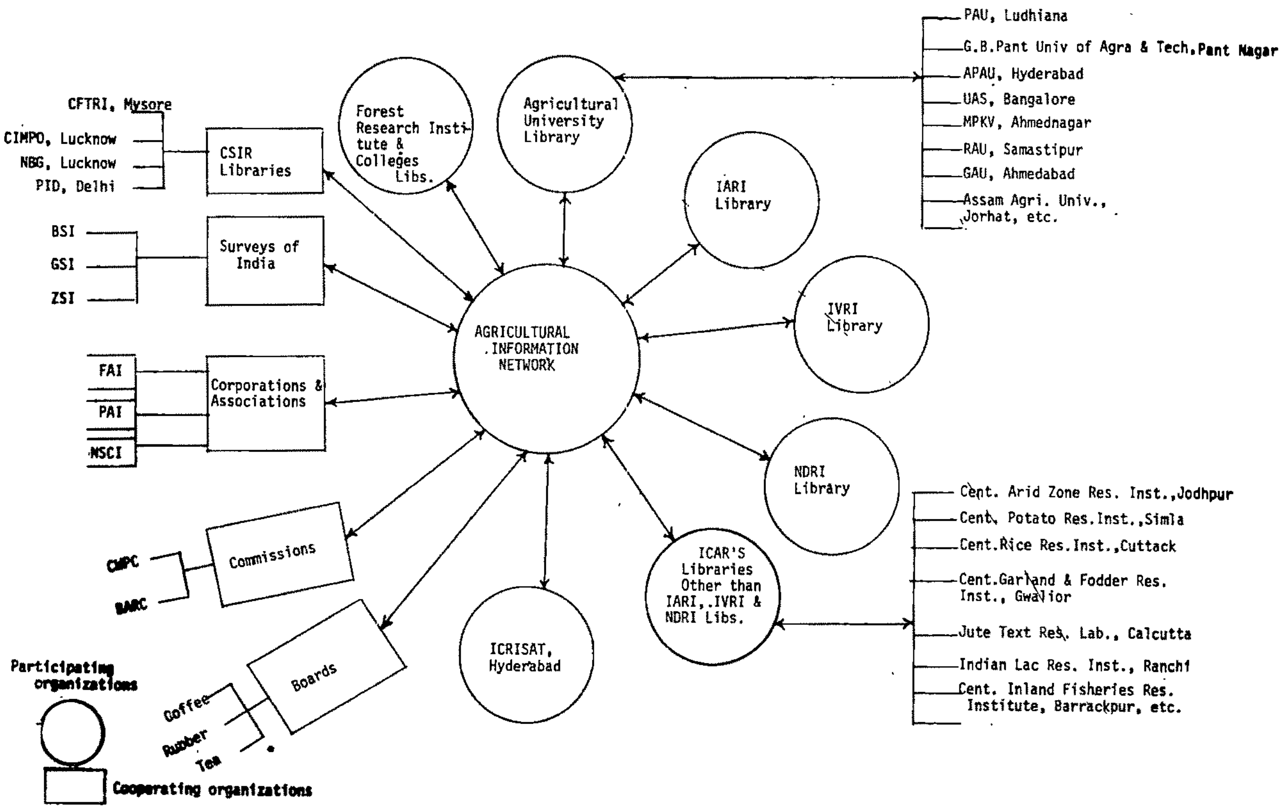
Abstracting and Indexing Services of interest to agricultural scientists and emanating from institutes in India

S.No.	Title	Sponsor and address	Year of start	Periodicity
1.	Advance Abstracts of contributions of Fisheries and Aquatic Sciences in India	Central Marine Fisheries Research Institute, Marine Fisheries P.O., Mandapam Camp, Tamil Nadu.	1967 - 1970	4/12
2.	Bibliography of Indian Fisheries (Formerly Quarterly Bibliography of Current Indian References on Fisheries)	Central Inland Fisheries Research Institute (ICAR), Barrackpore, 24 Parganas, West Bengal.	1962	4/12
3.	Bibliography on Irrigation, Drainage, River Training and Flood Control.	International Commission on Irrigation and Drainage, Central Office, 48 Nyaya Marg, Chanakyapuri, New Delhi-21.	1958	1/12
4.	Bulletin of India Raw Materials and their Utilization Ser.A - Current Literature on Raw Materials other Aromatic Plants Ser. B - Current Literature on Raw Materials other than Medicinal & Aromatic Plants.	Publications and Information Directorate, Hillside Road, New Delhi-12.	1974	4/12
5.	Documentation on Dairy Science	National Dairy Research Institute, ICAR, Karnal-1.	1970	4/12
6.	FAI Abstracts Service.	Fertilizer Association of India, Near Jawaharlal Nehru University, New Delhi-57.	1968	12/12
7.	Fertilizer Technology Abstracts	Planning and Development Division, Fertilizer Corporation of India, Sindhri, Bihar.	1963	12/12
8.	Food Technology Abstracts	Central Food Technological Research Institute, Mysore.	1966	12/12
9.	Indian Agricultural Index	G.B. Pant University of Agriculture & Technology, Pantnagar, Nainital.	1969 (Temporarily suspended)	12/12
10.	Indian Behavioural Science Abstracts.	Behavioural Science Centre, 2 Subhash Marg, Delhi.	1970	4/12
11.	Indian Science Abstracts	Indian National Scientific Documentation Centre, New Delhi-12	1965	12/12
12.	Irrigation and Power Abstracts (Formerly 'Abstracts, Central Board of Irrigation and Power)	Central Board of Irrigation & Power, Kasturba Gandhi Marg, New Delhi-1.	1943	6/12
13.	Theses Abstracts	Publishing and Translation Division, Haryana Agricultural University, Hissar.	1970	4/12

APPENDIX 2

AGRICULTURAL INFORMATION NETWORK

Organization


CFTRI, Mysore
CIMPO, Lucknow
NBG, Lucknow
PID, Delhi
CSIR Libraries
BSI
GSI
ZSI
Surveys of India
FAI
PAI
NSCI
Corporations & Associations
CMPC
BARC
Commissions
Coffee
Rubber
Tea
Boards
Participating organizations
Cooperating organizations
Forest Research Institute & Colleges Libs.
Agricultural University Library
IARI Library
IVRI Library
NDRI Library
ICAR'S Libraries Other than IARI, IVRI & NDRI Libs.
ICRISAT, Hyderabad
AGRICULTURAL INFORMATION NETWORK
PAU, Ludhiana
G.B.Pant Univ of Agra & Tech, Pant Nagar
APAU, Hyderabad
UAS, Bangalore
MPKV, Ahmednagar
RAU, Samastipur
GAU, Ahmedabad
Assam Agri. Univ., Jorhat, etc.
Cent. Arid Zone Res. Inst., Jodhpur
Cent. Potato Res. Inst., Simla
Cent. Rice Res. Inst., Cuttack
Cent. Garland & Fodder Res. Inst., Gwalior
Jute Text Res. Lab., Calcutta
Indian Lac Res. Inst., Ranchi
Cent. Inland Fisheries Res. Institute, Barrackpur, etc.

REPORTING OF THE INDIAN SOCIAL SCIENCE PERIODICAL LITERATURE IN INTERNATIONAL ABSTRACTING SERVICES

N.G. SATISH
Asst. Librarian, National Institute of Rural
Development, Rajendranagar, Hyderabad - 500 030.

The coverage and speed of reporting of the Indian sociological and political science periodical literature in the Sociological Abstracts and International Political Science Abstracts have been examined. The coverage of ICSSR Journal of Abstracts and Reviews: Sociology and Social Anthropology has also been examined to find out the extent of duplication with regard to Sociological Abstracts

Introduction

Growth of social science literature and the secondary services in the field are relatively recent phenomena. Nevertheless investigations into information requirements of social sciences (INFROSS) carried out in the University of Bath between 1968-70 reveal that abstracting and indexing services are the most used channels for locating references in social sciences and use of abstracting journals is slightly less among scientists [1]. Further, the study states that, 40% of the social scientists use abstracting services for current awareness in their respective fields [2].

Scope and Methodology

The present study examines the coverage and speed of reporting of the Indian sociological and political science periodical literature in two international abstracting services, viz., the Sociological Abstracts and International Political Science Abstracts. It also examines the coverage in ICSSR Journal Abstracts, and Reviews: Sociology and Social Anthropology, to know the extent of duplication with Sociological Abstracts

Four preceding volumes, i.e., 1974 to 1977, of the above stated journals were extensively scanned through to note how many articles from Indian journals were abstracted and find the currency of the same. Due to lack of any exhaustive bibliography of the current social science periodical publications an average number of articles published in each journal has been taken as the base for total output wherever necessary [3].

Indian Social Science Literature

Over the last few decades the social science publications have made much headway in our country. A survey of research publications made by Udai Pareek [4] states that the annual research publications in social sciences comes to an average of 2.089 Better off in this picture is the push in the periodical publications. According to ICSSR survey (1973) [5] the total number of periodicals published in a wide array of social science fields, in the country now comes to 863. Of these, the most relevant titles for the present study are 195, including political science (45) public administration (30) social sciencegeneral (35) sociology (37) and social work (38).

World list of Social Science Periodicals brought out by Unesco [6], lists only 96 of the Indian social science periodicals. This list is a highly selective one and includes only scientific periodicals, meaning those which regularly publish original studies and articles written by academicians and specialists in the field [7]. A modest estimation of the total number of articles published in these journals based on the average number of articles published in each issue, as stated in this list, comes to around 2.250 per year.

Reporting of the Literature

Tables I and II give a year-wise distribution of the articles abstracted and their year of publication in the primary sources. The total number of articles covered varies from 143 to 216 in International Political Science Abstracts and 109 to 201 in Sociological Abstracts. In 1977 the Indian political science literature accounted for 4.28% of the total entries in the International Political Science Abstracts and the same in Sociological Abstracts was 1.54%. Core journals in the field are comprehensively covered in the abstracts. Nearly 80% of the Indian periodical literature abstracted in Sociological Abstracts comes from 8 journals (see Annexure I) and more than 2/3 comes from 10 important journals in International Political Science Abstracts (see Annexure 2). The position is almost the same in ICSSR Journal of Abstracts and Reviews: Sociology and Social Anthropology, where first five journals make up 50% of the reported Indian literature and 11 journals out of 28 make up 80%.

Quickness

Abstracts published in all the three abstracting services are lacking in currency and serve

TABLE I

DISTRIBUTION OF INDIAN PERIODICAL ARTICLES IN INTERNATIONAL POLITICAL SCIENCE ABSTRACTS

Year of publication	Total No. of articles abstracted	Total No. of Indian articles abstracted	Year of publication of the original article						
			1971	'72	'73	'74	'75	'76	'77
1974	4377	143	6	44	84	9	-	-	-
1975	5015	136	1	20	53	60	2	-	-
1976	5039	216	-	1	34	97	82	2	-
1977	5040	216	-	-	8	3	124	73	8

TABLE II

DISTRIBUTION OF INDIAN PERIODICAL ARTICLES IN SOCIOLOGICAL ABSTRACTS

Year of publication	Total No. of articles abstracted	Total No. of Indian articles abstracted	Year of publication of the original article									
			1967	'68	'69	'70	'71	'72	'73	'74	'75	'76
1974	5213	201	-	18	39	23	27	87	7	-	-	-
1975	5764	115	-	-	-	9	27	37	36	6	-	-
1976	5956	141	-	-	-	10	18	9	35	52	17	-
1977	7057	109	4	-	-	4	5	3	10	26	25	32

current awareness needs only to a limited extent. One year delay is common in an international abstracting service due to the lengthy process of acquiring, selecting and abstracting of the articles. But such a delay in national service does not serve the purpose effectively.

In the Sociological Abstracts, Indian periodical articles reported are spread over upto six to seven years preceding the date of publication of the abstracts, with none of the current year's article reported as a rule. The spread of articles is also uneven, with bulk of it coming from journals published two years preceding the publication of the Abstract. Hence, it can only serve as a retrospective tool as far as Indian materials are concerned.

International Political Science Abstracts also has more or less a similar picture. Abstracts of Indian articles are usually spread over 4-5 years preceding the date of publication of this journal. Unlike Sociological Abstracts the major portion is reported within two years from the date of publication. Though current awareness is lacking, it gives a fairly good coverage of the periodical literature in the absence of any such service in the country.

ICSSR Journal of Abstracts and Reviews: Sociology and Social Anthropology is a highly selective one in view of its limitation of scope to the Indian publications only. An invariable delay of one year exists even in this service.

Periodical Coverage

Sociological Abstracts in its annual index names 32 Indian periodicals among the regularly scanned journals. But in the last four years,

TABLE III

OVERLAPPING OF ENTRIES IN SOCIOLOGICAL ABSTRACTS AND ICSSR JOURNAL OF ABSTRACTS & REVIEWS: SOCIOLOGY AND SOCIAL ANTHROPOLOGY

Abstracted in ICSSR Jl of Abstracts and Reviews: Sociology & Social Anthropology	Total No. of Indian entries	Abstracted in Sociological Abstracts 1974	'75	'76	'77
		201	115	141	109
1974	110	-	13	14	-
1975	105	-	1	23	7
1976	100	-	-	9	3
1977	45 (upto June)	-	-	--	3

articles from only 19 periodicals (Annexure I) have been reported. Except a few ommissions the journal coverage is similar to that of the ICSSR Journal of Abstracts and Reviews: Sociology and Social Anthropology. International Political Science Abstracts with the inclusion of 26 Indian periodicals for regular scanning makes no significant ommission of any scholarly journal in the field.

Duplication

The study was extended to know the overlapping of the entries in ICSSR Journal of Abstracts and Reviews: Sociology and Social Anthropology and Sociological Abstracts. It was found (Table III) that a considerable amount of overlapping, though not uniform, exists in the two services. In most of the cases the ICSSR journal of Abstracts and Reviews: Sociology and Social Anthropology reports much earlier than the Sociological Abstracts. Out of 110 abstracts in ICSSR Journal of Abstracts and Reviews referred to above in 1974, 27 have come in Sociological Abstracts. Similarly 31 of the 105 abstracts published in ICSSR Abstracts of 1975, 12 out of 100 of 1976 and 3 out of 45 of 1977 have appeared in Sociological Abstracts.

This also points out an interesting thing, viz., the wide difference in the articles reported, though the journals referred to are almost same.

Conclusion

It is clear from the above analysis that the comprehensiveness and currency of the Indian literature in the international abstracting services is still far way. At best they can serve as selective retrospective tools.

Though a large number of periodicals are published in the above stated fields only a handful of them make up most of the reported literature.

In the wake of wide difference in the reported literature in ICSSR Abstracts and Reviews and Sociological Abstracts, ICSSR journal of Abstracts and Reviews can go for a wider and comprehensive coverage of the qualitative literature with a better frequency to make the abstracts current and more useful.

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ANNEXURE I

Ranking of Indian periodicals based on the number of abstracts published in the Sociological Abstracts during 1974-66. Numbers in parenthesis indicate number of articles abstracted.

1. Indian Journal of Social Work - 91
2. Indian Journal of Social Research - 85
3. Eastern Anthropologist - 62
4. Man in India - 51
5. International Review of Modern Sociology - 45
6. Journal of Social Research - 38
7. Behavioral Science and Community Development - 34 Sociological Bulletin - 34
8. International Review of History and Political Science - 28
9. International Behavioral Scientist - 27
10. Sociology and Culture - 22
11. Indian Economic and Social History Review - 19
12. Quarterly Journal of Local Self-Government -12
13. Indian Journal of Sociology - 9
    Interdiscipline - 9
14. International Review of Sociology - 7
15. International Journal of Contemporary Sociology - 5
    Indian Journal of Psychology - 5
16. Indian Journal of Public Administration - I

ANNEXURE 2

Ranking of Indian periodicals based on the number of abstracts published in the International Political Science Abstracts during 1974-77. Numbers in parenthesis denote number of articles abstracted.

1. Indian Journal of Public Administration - 103
2. Indian Journal of Political Science - 79
3. India Quarterly - 72
4. Indian Journal of Politics - 54
5. Journal of Constitutional and Parliamentary Studies - 48
6. International Studies - 47
7. Indian Political Science Review - 44
8. Economic and Political Weekly - 39
9. Political Science Review - 28
10. Seminar - 27
11. Administrative Change - 25
12. International Review of History and Political Science - 22
    Journal of Political Studies 22
13. Institute of Defense Studies and Analysis Journal - 19
14. South Asian Studies (Jaipur) - 15
15. International Behavioral Scientist - 14
16. Africa Quarterly - 12
17. International Journal of Contemporary Sociology - 11
18. Journal of the Society for Study of State Governments - 9
19. Modern Review - 7
20. Eastern Anthropologist - 6
21. Development Policy and Administrative Change - 4
    Monthly Public Opinion Surveys - 4
22. Political Scientist - 4
23. Behavioural Science and Community Development - 2
    IISA Journal - 2

ANNEXURE 3

Ranking of Indian sociological journals based on the number of abstracts published in ICSSR Journal of Abstracts and Reviews: Sociology and Social Anthropology during 1973-1977 (June).

1. Economic and Political Weekly - 40
2. Sociological Bulletin - 37
3. Contributions to Indian Sociology - 36
4. Man in India - 35

5. Eastern Anthropologist - 33

6. Indian Journal of Social Work - 28

7. Indian Anthropologist - 19

8. Behavioral Sciences and Community Development - 16

9. Journal of Social Research - 14

10. North Eastern Research Bulletin - 12

11. Social Change - 10

12. Journal of Social and Economic Studies - 9

13. Indian Journal of Social Research - 7
South Asian Review - 7

14. Indian Economic and Social History Review - 6
Purushartha - 6

15. Journal of African and Asian Studies - 4

16. Journal of Indian Anthropological Society - 3
Social Action - 3

17. India International Centre Quarterly - 2
Journal of Higher Education - 2

18. Quest - 1
Indian Horizon - 1
Indian Journal of Industrial Relations - 1

DISTRICT LIBRARIES IN HIMACHAL PRADESH: A SURVEY

I. V. MALHAN,
and

G.S. THAKAR,

Deptt. of Library Science,
P.U. Chandigarh-160014

Describes the role of district library in a district and indicates the historical development of district libraries in Himachal Pradesh. Gives an assessment of resources of various district libraries and reviews the problems of these libraries. Includes the statistics regarding staff, holdings, services, etc. and mentions the various suggestions for improvement of these libraries.

Introduction:

Himachal Pradesh lies in the Himalayan region of India. It is a land of mighty snows boarded by Jammu and Kashmir in the North, by Punjab in the North-west, Tehri Garhwal and Dehra Dun district of U.P. on the South and by Tibet and Uttar Pradesh in the East. It has got 55658 sq.kms. of area with 1500 to 22000 feet above the sea level and with average rainfall of 63.45". The Alpine region remains under snow for about 5 to 6 months. This State was formed on April 15, 1948 by merging of some 30 princely states. The present paper gives an assessment of District Public Libraries. A questionnaire (See Appendix) was sent to all the district libraries and some of the libraries were actually visited by the authors.

Public library system in Himachal Pradesh was not so developed before independence as most of the people were illiterate with narrow religious views and having no interest in reading. The literacy in the State was only 5% in 1948 and it rose to 17.1% in 1961 and further rose to 27.2% in 1970. Presently the literacy rate is almost 35% and the government is further taking steps to increase this rate. As far as the history of development of public libraries is concerned it begins with the establishment of Mahima Library' at Nahan which was set up in 1930 by the Maharaja of Erstwhile Sirmaur State in the memory of his daughter 'Mahima'. In August, 1946, Maharaja Durga Singh of Bhagat State with his own efforts opened Shri Durga Singh Library at Solan. A district library at Bilaspur was established in 1952 on Mahatma Gandhi's birthday and district library of Kangra (Dharamsala) was launched with great expectation and lot of fanfare in the year 1954. The year 1959 can be considered as an epoch-making year in the history of library movement in Himachal Pradesh. The education department of Himachal Pradesh following in footsteps of other states came with full-fledged scheme of introducing in stages of network of libraries throughout the state. On the state level Moti Lal Nehru State Central Library was established on June 28, 1959 at Solan and within next two years district libraries in all the then existing districts namely, Bilaspur, Chamba, Kinnaur, Mahasu, Mandi and Sirmaur were established. In December, 1961 two mobile units were introduced to take the library services to the remotest areas as was possible according to the condition of roads. In the 1974 district libraries were established at Una and Hamirpur. The education department has many plans to improve the plight of these libraries and to extend their services to the rural Himachal.

RESULTS OF SURVEY

The maximum book collection among district libraries is 57,459 at Central Library Solan and the minimum collection is 3750 at Lahaul Spiti District library. The book stock in district libraries generally ranges from 10,000 to 20,000. The major collection is in Hindi and English languages but books in Urdu and Panjabi are also found. The collection usually comprises fiction, other recreational books and textbooks for local college students. Books on history, biography, travel, horticulture, rural industries and other branches of knowledge are also found.

The average number of periodicals subscribed in district libraries ranges from 50 to 80, with district and central state library, Solan subscribes the maximum number of 140, of current periodicals and Lahaul Spiti subscribing only ten periodicals. Almost all the periodicals subscribed in these libraries are of general nature. Whereever children sections exist sufficient number of periodicals are subscribed for children. Most of the libraries subscribe Hindi and English daily newspapers and central state library, Solan is the only library which subscribes one daily Panjabi newspaper. Popular film magazines are also included in almost all the district libraries.

Almost all the district libraries are sanctioned with a staff of one librarian, one assistant librarian, one clerk, one peon and one chowkidar, and one part-time attendent and a part-time sweeper. Most of the district libraries lack in staff and do not possess the complete staff as sanctioned by the government. Almost all the District Libraries fulfil the qualifications required by a librarian. Only librarians of Lahaul Spiti and District Library Una do not fulfil the requisite qualifications

Library buildings of most of the District libraries are not properly built and inadequate. Some of the libraries even do not have their own building and hence are stocked in rented buildings. Even those which have got their own buildings do not have a provision of future extension. Most of the libraries have got three sections e.g. reference section, lending section and the periodical section. Some of the libraries also have a children section attached with them. The children section of the central State Library, Solan is headed by a full-fledged librarian, while the children sections of other district libraries (wherever present) are mostly looked after by the part time lady attendents.

Most of the libraries have got the wooden furniture. The book almirahs are usually of wood and glass make up. Most of the libraries possess an average number of about 50 chairs, but district library, Lahaul Spiti possesses only 12 chairs and that of Mandi and Solan have more than 150 chairs in their stock.

The membership of these libraries is open to all the residents of Himachal Pradesh. Any person residing within the area of a library can be the member of a district library with the recommendation of an M.P., M.L.A., College Principal, member of local municipal authority or any government gazetted officer, who is a resident of H.P. Membership is free but a refundable security of Rs. 10/- is charged. Majority of the members are government servants and students of local colleges.

Most of the district libraries have open shelve system. All the district libraries except that of Hamirpur follow the Dewey Decimal Classification. Almost all the district libraries have dictionary catalogue in their libraries. District library Una and Himirpur do not have a catalogue yet.

Reference service is not properly provided in these district libraries. Lack of staff, lack of upto-date reference collection, scarcity of funds and lack of inquiry from the readers' side are some of the reasons for improper reference service. Inter-library loan services are available in most of the district libraries. Libraries at Solan and Mandi also possess mobile units which provide mobile services to the areas of Mahasu, Sirmaur, Bilaspur, Chamba and Mandi districts. The major service of all district libraries is circulation of books. Usually two books are issued to a member and the loan is valid for a period of two weeks only after that a fine at the rate of 5 paise per document per day for the first week and 10 paise per document per day is charged for the subsequent period. Most of the libraries follow the Newark charging system. The number of books issued daily varies from 50 to 100, while the average number of daily visitors ranges from 100 to 200.

All the district libraries except District Library, Kangra (headquarters at Dharamsala) observe Tuesday as Weekly off and last saturday and other gazetted holidays as closed days, however, the periodical sections remain open except three national holidays (i.e. 26th January: 15th August and 2nd October). The District Library Kangra observes friday as its weekly off and last Thursday of every month as holidy. The timings of most of the district libraries are same as that of State Central Library i.e. 9.30 a.m. to 12 noon in morning and 4.00 p.m. to 8.00 p.m. in the evening in summer and 12.30 p.m. to 7.30 p.m. in winter.

All the libraries directly or indirectly are under the administrative control of education department of the Himachal Pradesh. Almost all the libraries conduct annual stock taking. Librarians are not held responsible except in case of abnormal losses. The budget provision in these libraries varies from 7,000 to 65,000. The District library Kinnaur has the minimum budget while the District Library, Chamba has the maximum funds at its disposal. None of the district libraries has got any provision for weeding out of the collection.

SALIENT FEATURES OF SOME DISTRICT LIBRARIES:

The special feature of this library is the children's department. This section has got apparatus for film show. Besides, books educational toys are also serviced. This section undertakes a programme of reading, recitals, story telling and children dances It also organizes childrens' Day Exhibition every year, on 14th of November. The average number of children visiting this section daily is about one hundred.

District Library Nahan stores a good collection of manuscripts and rare books. The library is short of space and urgently needs one more reading room and more space for books. The reading rooms are generally crowded and at times the readers have to sit outside for want of space.

At Una the district library was established in 1974 by hiring two rooms in the Government High School. The library is without a District Librarian and all the purchases are made by District Education Officer who looks after the library in addition to his normal duties. Most of the books are unclassified. The appointment of a librarian and additionall funds is the immediate requirement of the library.

Mandi:

The town of Mandi has the highest literacy percentage in Himachal Pradesh, but its library is housed in a dark and dingy basement of the 100 years old dialapidated court building. Once it was located on a college campus. This library received 4298 books from Raja Ram Mohan Roy Foundation, under its assistance programme. The Library had a mobile van which went out of order in the year 1974.

District Library at Chamba is housed in a college and most of the visitors take it to be a part of the college.

Dharamsala:

The district Library Kangra has its headquarters at Dharamsala. It was started with only a few books but now it has 30,000 volumes and has built its collection much faster than any other library. Two books are issued for a fortnight but those who live more than 8 kilometers away from the library can keep the books for a month. The library has closed access system. The water tap of library usually remains dry and the library staff brings water from the distant places for the visitors. Library is without any toilet. Though it has a children's section but it remains closed for want of staff and accommodation. The reading room is insufficient and has a seating capacity of 15 only. There is special seating arrangement for women. An earthquake which shook Dharamsala in June 1978 did considerable damage to this library. There is a proposal to set up an art gallery near the library.

District Library Hamirpur is a combination of district and tehsil library.

PROBLEMS:

1. There is lack of proper building for district libraries. The buildings are not according to the norms laid down for a district library. Most of the buildings have inadequate space.

2. All the districts do not have facilities for mobile service.

3. Uniformity in size and modern kind of furniture is not there. Some of the libraries even have insect fed wooden furniture.

4. The lighting arrangement in many libraries is not upto the mark.

5. Children's sections wherever exist are usually not properly functioning.

6. Sometimes the non-technical people who know nothing about libraries are put to control the district libraries. Even the State Library Council has most of the bureaucrats as its members while librarians are not given a proper representation. Some of the District Librarians conveyed that they feel a lot of harrassments and problems due to their non-professional superiors.

7. Most of the district librarians are not provided with proper status and salary which creates hindrance in service to the clientele.

8. The financial needs of the district libraries are much more than the funds provided to them.

9. Closed access system is still prevalent in some of the district libraries.

10. All other services except lending of books are usually neglected.

11. District libraries lack a proper administrative set up and adequate structure. They are not under the control of State Librarian which should be the actual criteria. The Tehsil and Village libraries are also not under the control of respective district libraries.

12. None of the libraries conduct adult education classes.

13. Libraries lack the audio-visual material and Neo-literate type literature.

14. Some of the libraries are still headed by unqualified persons.

SUGGESTIONS:

1. Government should help to construct suitable buildings for District Libraries with the advice of expert librarians.

2. Library legislation should be introduced in the state without any further delay. A separate directorate of libraries will bring laurels for library movement in Himachal Pradesh.

3. On the occasion of this International Year of the child, the government should establish

well planned children's section in those libraries where they do not exist. Extra grants for children's books and children's services should be given to district libraries.

4. Mobile library service should be introduced in every district.

5. All the village, Block and Tehsil libraries should be under the administrative control of the district library. All the district libraries should work under the control of State Central Library and State Central Library in turn should function under directorate of libraries.

6. Librarians should be given attractive salary, proper status and sufficient financial powers so that persons of calibre can be attracted to public library services.

7. A district level public information centre should be established in each district library.

8. Extra staff should be provided so that the library can be kept open for longer hours and on holidays.

9. A state level strong association of librarians should be formed which may help to bring a library movement on this land.

10. Staff should be recruited according to the staff formulae laid down for these libraries.

11. The existing untrained staff in some of the libraries should be granted time and money to improve their qualifications so that they may be helpful to provide better services.

12. Under the Adult Education Programme of Indian Government these libraries should be given sufficient funds and resources so as to enable them to play some role in adult education.

13. Sufficient amount of audio-visual material should be granted to the District Libraries.

14. Open access system should be introduced in those libraries where it does not exist.

15. Overall supervision of the libraries should be in the hands of librarians and not with the bureaucrats.

16. A plan for resource sharing should be developed and introduced for the district public libraries.

17. A study of reading habits of readers should be made and suitable measures to increase reading habits, and love for libraries should be undertaken.

Acknowledgement

The authors are thankful to all the district librarians for their co-operation and help in the completion of this paper.

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Appendix I : Collection and current periodicals, newspapers, etc.

S.No.	District Library	Total holdings	Current periodicals	Newspapers				
				Hindi	English	Urdu	Panjabi	Total
1.	Bilaspur	18,000	56	8	4	-	-	12
2.	Chamba	12,000	55	4	6	2	-	12
3.	Kangra	30,000	50	3	5	1	-	9
4.	Lahaul Spiti	3,750	10	1	1	-	-	2
5.	Kulu	8,758	42	3	4	2	-	9
6.	Mandi	19,082	65	5	4	2	-	11
7.	Kinnaur	N.G.	40	2	2	1	-	5
8.	Nahan	21,987	73	4	7	2	-	13
9.	Solan	57,459	140	6	16	3	1	26
10.	Sirmaur	5,600	26	2	3	2	-	7
11.	Hamirpur	N.G.	15	4	2	1	-	7
12.	Una	8,000	-	4	3	3	-	10

Abbreviations used

BC = Browne charging
DC = Dewey Decimal
DT = Dictionary Catalogue
NG = Not given
NY = Newark Charging

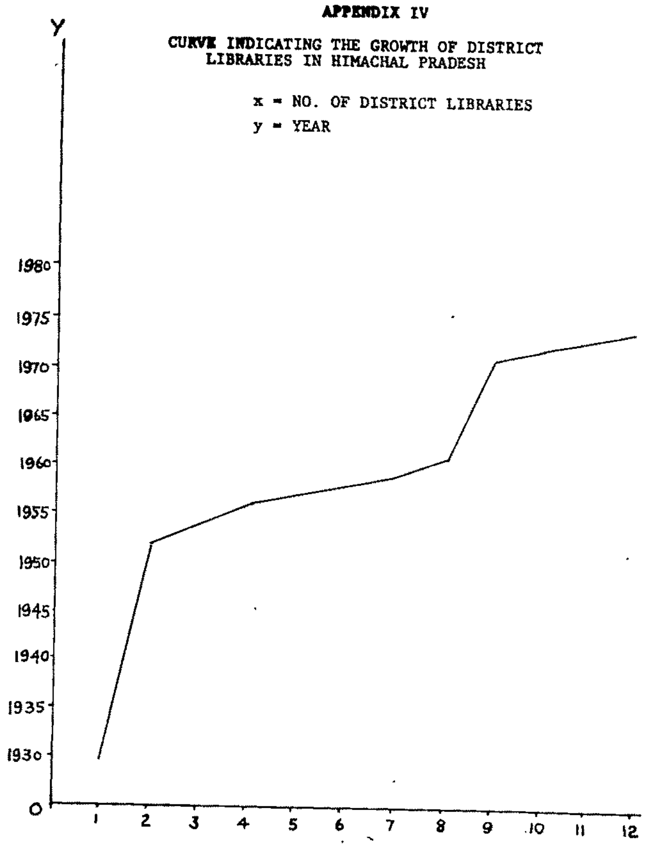
Appendix II : Staff

S. No.	District Library	Grade	Qualifications of Librarians		Other staff			
			Professional Qualifications	Academic Qualifications	Professionals	Non-professionals		
						Clerk	Attendant	Others
1.	Bilaspur	300-600	D. Lib. Sc.	M. A.	1	1	1	2
2.	Chamba	300-600	M. Lib. Sc.	B. A.	2	1	-	2
3.	Kangra	300-600	D. Lib. Sc.	M. A.	1	2	1	1
4.	Lahaul Spiti	125-300	C. Lib. Sc.	Matric	1	1	1	1
5.	Kulu	300-600	B. Lib. Sc.	M. A.	1	1	1	2
6.	Mandi	300-600	B. Lib. Sc.	B. Sc.	3	1	2	3
7.	Kinnaur	300-600	D. Lib. Sc.	M. A.	1	-	1	1
8.	Nahan	300-600	D. Lib. Sc.	M. A.	2	1	3	2
9.	Solan	700-1100	M. Lib. Sc.	M. A.	10	6	4	Peons=11 Driver =1
10.	Sirmaur	300-600	D. Lib. Sc.	B. A.	1	1	1	1
11.	Hamirpur	300-600	D. Lib. Sc.	M. A.	3	1	2	-
12.	Una	125-300	-	Matric	3	1	-	2

Appendix III : Other statement regarding building, furniture, budget, services etc.

S. No.	District Library.	Building	Furniture			Open access/closed Access	Children Section Yes/No	Circulation System	Classification System	Catalogue Dict/Classified	Total membership	Administrative Control	Budget	
		own/rented	Chairs	Tables	Almirahs								Recurring	Non-Recurring
1.	Bilaspur	own	60	17	23	Open	Yes	N.Y.	DC	DT	1119	Director of Education	15,000	3,000
2.	Chamba	own	50	25	75	Open	Yes	B.C.	DC	DT	500	-do-	65,000	N.G.
3.	Kangra	own	50	10	60	Closed	Yes	NY	DC	DT	800	-do-	55,000	5,000
4.	Lahaul Spiti	Rented	12	3	13	Open	No	NY	DC	DT	500	-do-	55,000	2,500
5.	Kulu	Rented	30	NG	20	Open	No	NY	DC	DT	395	Director of Education	54,200	N.G.
6.	Mandi	Rented	165	8	61	Semi Open	Yes	NY	DC	DT	948	-do-	62,000	10,500
7.	Kinnaur	Rented	55	8	7	Semi Open	No	NY	DC	DT	NG	-do-	7,000	N.G.
8.	Nahan	own	157	19	77	Semi-open	Yes	BC	DC	DT	2375	State Librarian	50,000	N.G.
9.	Solan	Rented	181	22	NG	Open	Yes	NY	DC	DT	NG	Director of Education	50,000	NG
10.	Sirmaur	NG	NG	NG	NG	Closed	No	Ledger	DC	NG	NG	-do-	87,00 ?	NG
11.	Hamirpur	own	65	12	30	Semi-open	No	NY	CC	No	225	D.E.O.	26,000	Nil
12.	Una	Govt. High school bldg.	37	38	20	Open	No	Ledger	DC	No	166	D.E.O.	NG	5,000

APPENDIX IV



CURVE INDICATING THE GROWTH OF DISTRICT LIBRARIES IN HIMACHAL PRADESH

x = NO. OF DISTRICT LIBRARIES
y = YEAR

Appendix V

QUESTIONNAIRE

1.		Name of the Library:		Dist. Library Hamirpur
2.		Year of establishment:		1974
3.		Librarian's Name:		D. S. Verma
		Qualifications:		MA (Double) D. L. Sc.
		Grade:		300-25-600
		Nature of duty:		Administrative duties with D. D. O's powers & Technical
4.		Staff Strength:		
	a)	Professionals:	3	Out of three prof. one Asstt. librarian & one peon from Tehsil library- likely to be separated at any time
	b)	Clerical:	1	
	c)	Attendents:	2	
	d)	Others:	-	
5.		Number of holdings:		
	a)	Books + Bound Periodicals:		
	b)	Current periodicals subscribed:	15	

c) Audio-visual material: Nil

d) Other documents (Rare Books/Mss. etc):-

e) Newspapers subscribed:

(i) Hindi: 4

(ii) English: 2

(iii) Urdu: 1

(iv) Punjabi: Nil

6. What system do you follow in the library:

a) Access/Semi-open: Semi-open

7. Library Timings on holidays: 9 1/2 hrs to 4-7 p. m. hours.

Library Timings on General working days: 9 1/2 to 1 p. m. 4. 7 p. m.

8. Who selects the books for purchase: Library Committee

9. Administrative Control of the Library: Librarian's Controlling
(D. P. I. /Education Secy. /State Librarian/Any other)

10. What system of classification is adopted:
(Colon/Dewey/No scheme) The librarian has joined just in Sept. 78

11. Whether library posses its own building/rented
building:

12. Quantum of library furniture:
(Chairs, Tables, Shelves & Almirahs etc.)

65 12 30

13. Whether separate children section:

14. Various sections of Library: (Pl. Comment)

15. Whether any book-mobile service conducted: No

16. Whether you receive free books from any foundation in
the country:

17. Annual Budget:

(a) Recurring:

(b) Non-Recurring:

18. Whether you provide reference service/guidance & counselling
service/Inter Library Loan service/Bibliographic/Indexing service:

19. What system do you follow for circulation:

a) Browne/Newyark/Ledger:

20. Loan Period: 14 Days.

21. Do you conduct annual stock taking: Yes

21A. Is the library closed during the days the stock-taking is in progress.

22. Do the staff compensate for the losses: Librarian is power to write off the loss of Rs. 200/- per year.

23. Seating capacity for readers: 30 seats

24. Approximate number of readers: 30 to 40 daily

25. Library Committee consists

26. Library Security/Membership etc.: Govt. Servant free, Rs. 10 from others.

27. How many books are issued to a member: 2 books

28. Total membership: 225

29. Library Catalogue:

a) Dictionary:

b) Classified:

c) No Catalogue:

30. Any library problem you are facing:

31. Your views, suggestions, comments etc. about your profession.

The library remained without librarian till Sept. 1978. The technical side remained totally ignored. This library is a combination of Dist. & Tehsil library. Tehsil library is consisting of one Asstt. & one peon. They are likely to be shifted with Teh. library books to a Tehsil flead guarders. If a library is equipped fully with its staff other problem becomes minor. In general the profession has no its recognition.

FOCUS ON UNISIST PROGRAMMES

The following items have been selected from the UNISIST Newsletter Vol 6, numbers 1-4, 1978.

INTERGOVERNMENTAL COUNCIL FOR THE PGI

The Intergovernmental Council for the General Information Programme held its first session at Unesco House from 21-25 November 1977. This Council is composed of the following Member States: Algeria, Argentina, Belgium, Brazil, China, Colombia, Congo, Cuba, Egypt, Federal Republic of Germany, France, German Democratic Republic Ghana, India, Indonesia, Iran, Japan, Morocco, Netherlands, Nigeria, Norway, Peru, Senegal, Uganda, United Kingdom, Upper Volta, USA, USSR, Yugoslavia, Zaire.

At this meeting the Council elected its Bureau. The Council examined the PGI's current projects in the light of Unesco's Medium-Term Plan, a proposed outline of the General Information Programme for the 1979-1980 biennium, and the participation of Member States in that Programme as well as the co-ordination of their activities to that end.

Current projects were carefully reviewed and commented together with the relevant allocation of funds. As regards the proposed outline for the PGI in 1979-80, the Council supported the principle of an integrated programme and discussed priorities for the distribution of funds to the respective sub-objectives. Ways and means designed to improve the participation of Member States in the PGI, in particular the creation or reinforcement of national co-ordinating bodies were discussed at length.

THE ISDS INTERNATIONAL REGISTER OF SERIAL PUBLICATIONS

The purpose of the ISDS, set up within the framework of UNISIST, is to establish a register of world serial publications covering the full range of recorded knowledge and containing the essential information for the identification and bibliographic control of serials.

At present, the ISDS network includes 39 Operational Centres linked by machinery that enables some 80% of the world production of serials publications to be handled.

The Centres forming the network systematically register all new serials published since 1971 and title changes which have occurred since that date. They also register older serials in accordance with their own needs and on request from users. Serials published in countries where no centre has yet been established are processed by the International Centre. The file now includes approximately 50.000 records, some 20.000 records having been added in 1977.

All ISDS records contain a common set of data elements that enable publications to be identified. The format is based on the Marc serials format. All computer records are available in the ISDS exchange format based on the ISO 2709 norm.

At present, the complete machine-readable register is available to ISDS centres only. Sub-sets are supplied to the organizations that have integrated or wish to integrate the ISSN and key-title into their systems.

The Register is produced on standard A6 '105 x 148 mm) microfiche, with a reduction rate of 48 x (270 frames), and numbered sequentially. The records, listed in ISSN order, contain all the essential information present in the machinereadable file. Two indexes give access to the full records: an ISSN index and an alphabetical index listing the key-titles and variant forms of titles. The Register is regularly updated by the ISDS Bulletin. The Bulletin is published bi-monthly..... As from 1978, the printed Bulletin will be replaced by an edition on microfiche, having the same structure as the Register.

The second meeting of the General Assembly of the ISDS was held on 4 and 5 April 1978 at Unesco House in Paris... The Director of the ISDS International Centre presented a report on the Centre's activities, together with a medium- and long-term plan for developing the system. The meeting had a débate on the proposals made by the Director-General of Unesco and those made by the Governing Board of ISDS, which had been communicated to all Member States by a circular letter. At the end of a lengthy discussion, the Assembly accepted those proposals and decided that Member States' contributions would be fixed in accordance with the principle and method of calculation set out in the proposals.

INTERNATIONAL SYMPOSIUM ON BIBLIOGRAPHIC EXCHANGE FORMATS

The Symposium was held in Taormina (Sicily) from 27 to 29 April 1978. It was organised by the UNISIST International Centre for Bibliographic Descriptions (UNIBID) in co-operation with ICSU-AB, IFLA, ISO and Unesco.

The purpose of the Symposium was to bring together experts and practitioners in the field of exchange of machine-readable bibliographic information to discuss the nature and role of bibliographic exchange formats. One of the specific objectives was to define the essential elements of an exchange format as distinct from a local processing format.

Sessions were devoted to Specialised international exchange formats; National exchange formats; Carrier format; Bibliographic data elements; Generalised international exchange formats and towards a common exchange format.

The Symposium recommended that a common bibliographic exchange format be developed as a high priority by IFLA, ISO, ICSU-AB, Unesco, UNIBLD and other interested parties; that this common exchange format be defined as including: (a) record structure, (b) content designators, and (c) data elements (The record structure being defined as in ISO 2709, and the emphasis being placed on the establishment of standards for content designators and data elements) and it further recommended that Unesco's co-ordination and support be sought to achieve this end.

The Symposium also recommended that ISO undertake the preparation of a bibliographic data element directory and its maintenance as an item of high priority. The Symposium also recommended that ISO prepare guidelines for the use of ISO 2709.

SELECTIVE DISSEMINATION OF INFORMATION

During 1975-1977 Unesco helped to initiate, with the technical assistance and generous support of the Canada Institute for Scientific and Technical Information (CISTI), a series of pilot projects in selective dissemination of information (SDI) to serve the research communities in Member States. Under this programme, national SDI services with limited service to neighbouring countries were established in three Member States (Argentina, India and Mexico), using the CAN/SDI software developed by CISTI and Chemical Abstracts Condensates tapes available at a special introductory tariff. All three national services are continuing without Unesco support and are gradually expanding in terms of subject coverage and users served.

In view of the success of this approach and the interest shown in Member States, Unesco and CISTI have now agreed to distribute the CAN/SDI programme as an integral part of the CDS/ISIS computer software already available through Unesco. The new CDS/ISIS-CAN/SDI software will encompass a wide range of documentary functions. The CAN/SDI component will provide for efficient selective dissemination of information using internationally available bibliographic data bases, while the CDS/ISIS component will enable bibliographic control and retrospective retrieval services, in batch or on-line modes, using both international and national data bases.

From 1979 onwards, the CDS/ISIS-CAN/SDI software will be provided to interested organizations in Member States wishing to initiate computerized documentation services upon signature of an agreement and subject to limitations on the number of requests which can be satisfied. Unesco will organize appropriate international training in the use of the software and will arrange for its installation...

IINTE CLEARING HOUSE

The Clearing House at the Institute of Scientific Technological and Economic Information (IINTE), Warsaw, Poland, established in 1968 under the auspices of Unesco, provides information on thesauri, classification schemes, keyword and subject-headings in all languages and covering all fields of human activity.

In order to facilitate and improve the collection and distribution of this information, contacts have been established with the Toronto University Library, which has partly continued the clearing house activities of the Case Western Reserve University in Cleveland, Ohio. It was agreed that the Toronto University Library would send its material in catalogue card-form to IINTE, and that it would collect information on thesaurus and classification systems, etc., produced in North America, Latin America, Australia, and that this information would be published in the IINTE Bulletin. Toronto University Library also has plans to publish a bibliography on its holdings at the beginning of 1979.

MEETING ON THE APPLICATION OF SCIENTIFIC AND TECHNOLOGICAL INFORMATION IN DEVELOPMENT, BANGALORE

In collaboration with COSTED/ICSU (Committee on Science and Technology in Developing Countries), the Division of the General Information Programme organized a meeting on the Application of Scientific and Technological Information Development, in Bangalore from 18 to 20 May 1978. Seventeen experts participating in their individual capacities and representing varying types of expertise which included technology transfer, agriculture, medicine, communication, education and information, participated in the discussions which were intended to examine the interrelationship of the various scientific fields in the process of transfer of information from its source to its ultimate user in the rural areas and to identify the role of the scientific and technological information services as a support to national development.

The meeting recognized that scientific and technological information services, particularly those in developing countries, did not reach and were not geared to serve the needs of the economically and socially less developed sections of the community were found to function independently of the national information system leading to a duplication of effort and inadequate and inefficient use of information resources. The meeting drew up a number of recommendations addressed to national planning bodies and to international organizations. The meeting referred specifically to the forthcoming UN Conference on Science and Technology in Development and drew attention to the fact that one of the prerequisites to effective technology transfer was the presence of well organized information transfer chain to carry scientific and technological information to the rural sector. The role of change-agents and the need for specialized training programmes for them was also discussed.

The report on this meeting will be published shortly in the form of a joint UNESCO/COSTED document which will be available to interested organizations and individuals.

CONSULTATIVE GROUP TO THE UNESCO BULLETIN FOR LIBRARIES

The first meeting of this Consultative Group met in Unesco, Paris, on 1 and 2 June 1978.

The following consultants were invited to this meeting: Mr A Kent, Director, Communications Program, University of Pittsburg (USA); Mr M A K Madkour, Industrial Development Centre for Arab States, Cairo (Egypt); Ms F A Ogunsheye, Professor and Dean of Education, Faculty of Education, University of Ibadan (Nigeria); Mr Gy Rozsa, Director-General, Magyar Tudomanyos Akademia Konyvtara, Budapest (Hungary); Mr S A I Tirmizi, Deputy Director, National Archives of India, New Delhi (India); and Mrs L Valderrama, Chief, National Bibliography/Copyright, National Library, Lima (Peru).

The current editorial policy and future plans for the Unesco Bulletin for Libraries were examined and the consultants were called upon to give advice on its title, structure and coverage.

The consultants considered the Bulletin as a valuable source of information, especially on the developing countries. They suggested that due consideration be given to the geographical distribution of authors and emphasis be placed on specialized topical coverage. They also recommended the avoidance of merely descriptive articles and expressed the wish that broad syntheses and surveys highlighting new trends in the information field be preferred in the future for publication in the Bulletin They felt that the Bulletin should review information activities of Unesco and other governmental and non-governmental international organizations.

Suggestions were also made concerning the periodicity and the possible change in the title of the Bulletin.

SECOND SYMPOSIUM OF EDITORS OF DOCUMENTATION, LIBRARY AND ARCHIVES JOURNALS

This Symposium was organized by Unesco, within the framework of its General Information Programme in co-operation with the National Commission for the German Democratic Republic for Unesco, and held in Berlin (German Democratic Republic), on 4-7 September 1978.

The Seminar was attended by fifty-two participants from: Argentina, Australia, Brazil, Bulgaria, Canada, Czechoslovakia, Denmark, Federal Republic of Germany, Finland, German Democratic Republic, Ghana, Hungary, India, Iran, Netherlands, Poland, Romania, Spain, United Kingdom, USA, USSR, Yugoslavia.

The aim of the Symposium was to seek ways and means of improving the preparation and presentation of primary and secondary periodical literature of the profession and to obtain closer co-operation and co-ordination between editors of documentation, library and archives journals.

The agenda included:

(a) Co-operation among primary journals and between primary and secondary journals on documentation, libraries and archives and their role in the implementation of Unesco's General Information Programme. Participation of NGOs, e.g. IFLA, FID and ICA;

(b) Standardization of the preparation and the presentation of journals (table of contents; transliteration, bibliographic descriptions; ISSN; abstracts, etc.);

(c) Exchange of articles, reports and other information on a bilateral and multilateral level;

(d) Arrangements for referring and reviewing;

(e) Promotion of publication of journals in developing countries;

(f) Interco-operation among international journals and their co-operation with national journals.

The participants drafted recommendations some of which emphasize the following aspects:

The promotion of the exchange of articles, etc., between primary periodicals and the establishment of measures for tables of contents or abstracts in one of the major languages to be forwarded to the existing secondary services;

The launching of a study of typographical presentation used in journals in the field of documentation, librarianship and archives, in order to reach optimum standards;

The preparation of a study which would indicate which of the important national and international primary periodicals provide abstracts in at least one widely used language to important articles;

The promotion of bilateral or multilateral agreements with a view to help developing countries as regards equipment, printing, distribution of library journals and theoretical and practical training

BOOK REVIEWS

Documentation and Information: services, techniques and systems, by B. Guha. Calcutta, World Press, 1978/XV, 369; Rs 85.00 .
[Reviewed by R. Satyanarayana]

It has been said that a writer takes up his pen only when he has something new to say or when he intends to say things already said in a new way. One is not always sure whether, this dictum applies to technical writing. However, Prof. B. Guha in his book entitled "Documentation and Information: Services, Techniques and Systems", has demonstrated in practice the second part of the dictum referred to above in an admirable fashion showing at the same time considerable respect to the former aspect.

Since (the late) Dr. S. R. Ranganathan published his book entitled "Documentation and its facets" the only other publication on the subject published in India appears to be that of Prof. B. S. Kesavan. In a way, both these publications are pioneering efforts from the pen of two great men of our times. But, neither is meant to be used as a text-book at any level. Their usefulness lies in providing both philosophical as well as pragmatic approach to the subject.

This work by Prof. B. Guha is intended to be a text-book; an important instrument of teaching. Anyone familiar with 'Saha and Srivastava's 'Treatise on Heat' cannot, but, appreciate the statement that 'purposeful teaching usually culminates in a useful textbook'.

Since the starting of DRTC and INSDOC courses in documentation, many of the universities have introduced the subject of documentation in their Master's degree courses and the subject is being taught and studied at various levels. However, no one has come out with a systematic text-book worth its name on this vital area of Information Science. Therefore, Prof. Guha's effort fulfills a long felt need. Prof. Guha is well equipped to undertake such an onerous task, because of his long experience not only as a teacher of this subject, but also, as one who practiced documentation in many of its facets.

The book is developed in five different segments. The concept; the Trinity of documents, users and services; the techniques; the controls and the canvas. The nomenclature of these segments is at once thought provoking and appears to be logical though, one does not always lead to the other.

The very 'concept' of 'Documentation' has been a source of frequent definitional controversy. The author has carefully avoided to add to this controversy, by not propounding his own definition. In the segment entitled 'the concept', he has enumerated and discussed most of the available definitions for the term bringing out clearly the changes that this concept has undergone over the years. Having analysed the changing patterns of 'the concept' the author implicitly records his dissatisfaction about the prevailing situation by obliquely referring to the lack of precise definition for this evolving concept. Such terms as Information Retrieval, Information Storage and Retrieval, Information Science and Informetics have been considered as patterns in the evolutionary stages of the concept.

It may however be pointed out that the development of new ideas in cybernetics and computer technology aroused expectations signalling the formation of a theory of Information Retrieval from which effective systems could be derived. But, it appears from the conceptual point of view, that we have still to achieve this objective. This might have prompted Prof. Guha not to pronounce the last word on "the concept".

It has been often said that "a discipline involves three major parts - science, applications and education, and that each part should support the other". If this context be thought of, one could perhaps better appreciate Prof. Guha's delineation of the segment" of the trinity of documents, the users and services". After discussing the evolution of the subject of documentation as a discipline, the author has attempted to present the subject in its applied form. Rightly, he has identified documents, users and services as the most important factors about which any practitioner should know before he sets up his practice. The many 'sources of information', with their specific characteristics, the variety of documents with different types of inter-relationships existing between them, the bearing that these factors have on search procedures for information have been analysed threadbare and the results have been presented in a manner easy to comprehend. In a discriptive account of this nature one often faces difficulty in segregating the essentials from the non-essentials. It is to the credit of the author that such a difficult task has been accomplished in a succinct manner.

To diagnose the information needs of the user community is the fundamental step towards the establishment of an effective and purposeful documentation service. Prof. Guha has analysed the different aspects involved in this activity and provided the needed techniques for this purpose. As one reads through this chapter one cannot fail to appreciate the pragmatic approach that pervades throughout this segment.

The distinction that exists between 'Information Services and Products' has been brought out clearly by the author in this part. The different approaches to information from the user's point of view, as also the techniques associated with the mechanics of production of information products have been discussed rather elaborately with illustrative examples.

Technology is on the march and innovations are the order of the day. Improved documentation techniques are being invented from time to time with a view to solving information retrieval and storage problems. Principles and prescriptive rules dealing with the organisation and management of bodies of scientific, technological and business information used in decision making process are being propounded continuously. The modern techniques such as indexing and abstracting used in the organisation of information form the subject of the segment entitled "The Techniques". The scientific approach behind each of the techniques like POPSI, PRECIS, SLIC along with their constraints has been clearly brought out by the author in this part. The art and science behind the practice of thesaurus construction, as also the major factors that should be considered in evaluating the performance of indexing languages and systems has received considerable attention of the author. The interpretations and illustrations provided in this part of the book clearly demonstrate the author's grasp over several of these complex techniques.

The fourth segment of this book is devoted to topics such as use of citations, bibliometrics and standards relating to documentation and information work. The author has named this part as 'the controls'. 'Controls' normally provide qualitative as well as quantitative measures for ranking of products. Quality control and standardisation are essential to keep up the product level and ensure product reliability. Standardisation is an essential feature for interchanging of products at national as well as international levels. The author has also discussed bibliometrics in general and also dwelt at length regarding the practical applications of Bradford Law meant to show the distribution of productivity in a collection of source documents. One wishes that the author could have elaborated this aspect with more illustrative examples. However, this part is a very useful addition to the book which definitely enhances the utility of this publication.

The last segment of this book "The canvas" is devoted to some of the modern developments taking place in documentation. The computer has entered into the arena of documentation in a big way. The current general availability of access to machine readable bibliographical data bases is the inevitable technological consequence of applying computers to the processing of bibliographical information. The computer revolution has proceeded rapidly and its several stages are now clearly discernible. Therefore, the author has attempted to present in a brief way how this powerful tool is being harnessed for documentation activity as well as in information storage and retrieval. It could have been ideal if the author had discussed these aspects rather in depth.

Prof. Guha, who is well informed about the current developments taking place in the field of information science, did well in discussing the concept of international network as also the progress of work under UNISIST program. The international efforts towards data compilation and the work of bodies like CODATA also find mention in this book. All these are very important developments taking place and every one belonging to the documentation profession must know these.

The 'canvas' concludes with a telling description of 'documentation scene in India'. Under this caption, the author has documented the landmarks in the development of documentation activity in India. He has also described some of the activities of Organisations like INSDOC, DESIDOC, the National Medical Library, The IARI Library. The contributions made by the Indian Standards Institution in the development of 'standards' for documentation work have also been briefly mentioned. The emergence of organisations like SENDOC, Social Science Documentation Centre(SSDC) has been mentioned as steps in the right direction. It is hoped that, the work of these organisations will augment the documentation facilities in the country. The efforts made in the direction of evolving 'The National Information System in Science and Technology (NISSAT), the NISSAT plan with its stated objectives have all been discussed in a brief manner. In the light of many developments that have taken place in recent years, this account may appear rather sketchy, even so, it is essential to understand the emerging trends in the field of documentation at the national level.

One of the noteworthy features of this book is that it contains systematically arranged bibliographical references at the end of each chapter. These references constitute an excellent reading material on the several aspects dealt within the body of this text. Perhaps, many teachers of 'documentation' may utilise these in a purposeful manner, for enhancing their knowledge. Prof. Guha has exhibited considerable critical faculties in appending highly relevant reading material pertaining to the aspects dealt with in this publication.

The entire book is written in a lucid style ideally suited to the Indian students. The author has carefully avoided packing his work with randomly selected quotations from other published works. His restraint in this regard must be appreciated for, not many of us can resist from this temptation:

No human activity can be deemed to be complete or perfect. Judged from this point of view, Prof. Guha's work is wanting in some respects. For example, this book should have contained a brief account on practical aspects of reprography, which is very essential to the practitioners of Documentation in today's context. Of course, the author might have had valid reasons of his own for not including this aspect. Another area, where the author could have provided useful information appears to be pertaining to the translation facilities (of course, the art and science of translation is a different matter altogether).

There is considerable scope to add much more relevant information pertaining to the application of computers to bibliographical processing such as information pertaining to commercially available bibliographical data bases, their specific utility in providing SDI and retrospective services, and some information regarding the software packages readily available for this purpose together with the prerequisites for operating these packages. Many such things can be thought of as useful inclusions. The author will be enhancing the utility of this compendium by including these aspects at least in the future editions of this work.

Barring 'a few' inadvertant errors like"....what exactly are done" (p.9) and a few drops in spelling (p.x, creadd) the book is neatly printed and well got up. This, no doubt adds to the readability aspect of this book.

In conclusion, "Documentation and Information" is one of the very few good textbooks that have been published on the subject and could be read with profit. It may prove to be an indispensable tool not only to the students of Library and Information Science, but to all those engaged in the documentation service. Prof. Guha is to be congratulated for accomplishing this task.

Directory of United Nations information systems and services. Geneva, Inter-Organization Board for Information Systems, 1978, 267p. Free distribution.
[Reviewed by B Guha]

There are now more than thirty members in the 'United Nations family'. All these member organizations gather and disseminate information. For some of them, it is one of their most important functions. To support programmes for international cooperation and development and to serve the needs particularly of recipient countries, a number of information systems and services have been established by them. The Directory under review is the first comprehensive attempt to describe this important sector of United Nations activities.

The Directory contains the basic particulars of more than hundred information systems and services. They are in the form of libraries, bibliographic services, referral centres, etc. In subject coverage, they range from human rights to agriculture and varies from very general to the highly specialised aspects of science, technology and economic and social questions.

The Directory is divided into four parts. Part I describes in brief the functions of 36 organizations of the United Nations family. Part II sets out the particulars of the scope and content of more than 100 information systems and services showing the user what exists and how he can access the services offered, obtain publications, references, etc. Part III is the Country Index. It provides more than 2500 addresses in 155 countries showing where U.N. Organizations maintain offices, where the centres are located which contribute information or provide national input to the various systems, and the libraries where the publications of many organizations can be found. Part IV is the Subject Index intended to enable the reader to find the systems which deal with given areas of interest.

The Directory will be an extremely useful reference tool to all users of information services and should also be of considerable interest to students, teachers, and others who want to have anthentic information about U.N. information systems and services.

Fundamentals of library science, a modern approach, by J.S. Sharma. Delhi, MacMillan Co., 1977. ix, 258p. Rs. 55.00.
[Reviewed by B. Guha]

The author of the work, Dr. Sharma, is a well known personality in the library field. Many contributions have come from his pen. The present work, however, includes some material from the author's earlier book 'Substance of Library Science.'.

The text is presented in three parts. The first part has two chapters on the 'Changing Concept of Library Service' and 'History'. The third chapter is on the 'Fundamentals of Library Science' which is exactly the title of the whole work also. In this chapter Dr Sharma mainly deals with the hackneyed question whether or not library science is a science. He comes to the inevitable conclusion that it is a science. Finally, the fundamentals of library science are stated to be -- Organization, Administration, Classification, Cataloguing, and Technical Services. The next five chapters in the first part are devoted to a detailed consideration of these fundamentals. The usual textbook style presentation is to be seen in all these chapters with lots of quotations from important sources. Each chapter has a list of references, introduced as 'Notes'. However, even a cursory glance at these references will reveal that most of the references are quite old. Very few of them go beyond the 1950s.

Taking this clue a close scrutiny of the references in the Chapter on Cataloguing reveals that excepting Landau's Encyclopedia of Librarianship all other references are as old as the 1950s. Authors such as Sharp, Margaret Mann, Jast, Norris, Dorcas Fellows, Jolley are all there but works of more recent authors like Lubetzki, Dorothy Anderson, P S Escreet, Bakewell and others are not to be found. A look into the mere eight pages text of this chapter further reveals that there is not even any indirect mention of anything like the AACR. The present reviewer fails to understand what 'modern approach' the author intends to provide to his readers in this particular chapter. In fact it is difficult to visualise a group to whom this will be of any use. In the chapter on Technical Services some portion has been devoted to reprographic devices. While coming to explain Offset litho, the author says, "Offset litho reproduction method is even cheaper than photostating because the cost of composition, proof reading, correction, etc., can be avoided.". (p 134). The present reviewer would not like to imagine that the author really believes in what has been stated, which suggests photostating requires composition, proof reading, etc. But this absurd statement is there to mislead others, especially the students.

The second part has only one chapter entitled 'Modern trends in library service in India'. At best it can be said to be a very personal view of the author of events and developments in the bibliographical world. A number of Indian bibliographical works have been mentioned in this chapter. There are, however, a number of errors of different nature in them. A chronological list of Indian periodicals on library science (p.179-80) has surprisingly in it titles like the Indian Science Abstracts, Indian Book News & Reviews, and Indian Society for Information Science(just the name of the Society). At the same time a number of well known library science periodicals have been missed, including the titles Library Science with a slant to documentation and LASLIC bulletin. INSDOC List of Current Scientific Literature has been mentioned in one place(p. 179)as an eminent reference book on periodical literature. In another place (p. 185) the same publication has been stated to be a bibliography of Indian periodicals. ! A number of union catalogues are also mentioned along with it. The absurdity of all these is quite obvious but they may mislead students, for whom the book is claimed to be indispensable. The reviewer was intrigued to find four references (48 to 51 in p.206) to the Journal. It took quite some time to establish that the references are to the Indian Library Association Journal.

The third part of the book has three chapters, beginning with a highly promising chapter devoted to Automation. The other two chapters are on the Use of Library Resources and Creating Library Consciousness. The least that can be said about the chapter on Automation is that it is absolutely sketchy and is a half-hearted attempt. It provides nothing more than a few disconnected definitions and annotations on machines, processes, and systems. The other two chapters are surely better written than this.

Comparative and international library science, ed. by John F Harvey. Metuchen (New Jersey), Scarcrow Press, 1977. ix, 286p. $ 12.00. ISBN 0-8108-1060-3 [Reviewed by B. Guha]

There is enough evidence to suggest that interest in comparative and international library science has increased in recent years. Sustenance of this interest requires useful publications in the field. The present volume edited by one of the most eminent workers in the field will not only hold the interest but will go a long way in giving proper direction and guidance for the study and development of the subject.

The publication is a composite volume of seventeen contributions, from some of the best known names in the library and information field, with a brief introduction by the editor. The first part, with three contributions, is largely devoted to an attempt to define precisely the two areas of comparative librarianship and international librarianship and bring out clearly the nature and characteristics of them. The definition aspect is well taken care of by J. Periam Danton. D. J. Foskett, in the second contribution, brings out very clearly the nature of comparative and international librarianship with reference to studies in non-library field. It is held, "In politics and law we find the clearest distinction between the international and the comparative". The third contribution, by Frank L Schick, throws light on problems of research in comparative and international library science.

The second part, devoted to the theme of recent progress in international and comparative library science, contains fourteen contributions. They are a set of state-of-the-art papers assessing progress in comparative and international library science. Each paper is devoted to one major area of library science. Thus, there are papers on National Library Services, Public Libraries, Children's Library Science, School Librarianship, Health Library Science, Library Education, Information Science, Comparative and International Bibliography, etc. Chapter anthors, in the second part, include: Mohammed M Aman, Martha Boaz, Alan George Brown, H C Campbell, Mary Joan Campbell, D J Foskett, Anthony Thompson, B C Vickery.

Substantial chapter bibliographies and an Index enhance the value of the book. In the very first chapter Perian Danton has said, "There has been a steadily increasing volume of writing about comparative and international librarianship during the past two decades... Let us call a moratorium on writing about the subject and devote our energies to doing comparative work". The reviewer believes that the present volume will help us to move towards this goal. The book should be especially useful to library school teachers and students. eminent workers in the field will not only hold the interest but will go a long way in giving proper that the present volume will help us to move towards this goal. The book should be specially useful to library school teachers and students.

Distributed parameter systems: Identification, estimation, and control, ed, by Harmon Ray and Demetrios G Lainiotis. New York, Mercel Dekker, 1978. 616p. (Control and systems theory series, vol. 6). $ 49.50. ISBN: 0-8247-6601-6.

The volume presents a coherent exposition of the fast developing field of distributed parameter systems theory. It contains ten fairly lengthy chapters contributed by leading people in the field, in seven countries, who were requested to write over their area of expertise. The contributors represent the viewpoints of applied mathematics as well as those of several fields of engineering.

The book is divided into two parts. Part I, in six chapters, deals with the fundamentals of the theory and Part 2, in four chapters, discusses in detail several important specific applications, including chemical reactors, underground oil recovery, control of plasmas, and control of mechanical structures.

The present volume will serve as a basic reference for engineers and mathematicians in systems engineering, process control, and control systems design.

Indian Book Review Index 1975-76, comp and ed. by A R Sethi and H M K Moodgal. Gurgaon, Indian Documentation Service, 1978 XIV 123p. Rs 80 ($ 16 or 8). (Reviewed by B. Guha)

The Index is a new bibliographical venture of the Indian Documentation Service, which has a number of well known bibliographical publications to its credit. It is going to be published annually. It can hardly be over emphasised that book reviews play an important role in the selection of books by scholars and librarians. As several reviews of the same book may be published in different sources, it becomes necessary that there should be device or tool which will allow one to quickly locate these reviews. One may even look for reviews by some reviewers only or reviews published in certain journals. The Indian Book Review Index is a welcome move to meet this genuine need.

The present volume of the Index takes care of about 3000 book reviews relating to about 1200 Indian books. These reviews have been culled from about 148 periodicals. The entries have been arranged broadly by subjects and numbered. The contents page provides indication of the sequence and occurrence of the subjects with relevant entry numbers. This useful presentation is supported by an Author Index and a Reviewer Index. There is also a Periodical Index listing the 147 periodicals from which reviews have been indexed in the present volume.

The above will give an idea about a particular bibliographical need and how a tool has specifically been designed to meet it. However, since two professional librarians are associated in the compilation and editing of the publication, the present reviewer is tempted to point out certain inaccuracies which one would not normally expect. Let the Periodical Index, given in the preliminary pages be taken first. One finds in it a number of titles which have been given without place names. This may create some difficulty in their proper identification. One would naturally take it to be a complete list. Just one example would show that even on this count the list is not perfect. In items 631, 636 and 946 one periodical entitled 'Nagarlok' has been mentioned as the source of the book reviews. But this periodical is not mentioned in the Periodical Index. There may be a few more cases of such omission. There is another kind of fault also. There are some discrepencies in the rendering of some of the titles in the Periodical Index and in the text. A glaring example of this kind of fault is to be found in the title 'National Centre for the Performing Arts, Quarterly Journal', as given in the Periodical Index and as cited in the item number 178, 181 and others in the same page.

The Author Index and the Reviewer Index are also not free from irritating inaccuracies. Here are some examples showing the nature of errors that have crept into these indexes. If one wants to locate reviews of A. Appadorai's and consults the Author Index he is directed to items 598 and 649. A reference to item number 598 draws him blank as this entry is for some other publication. A reference to the other number leads the reader to another publication of the same author where the name is printed wrongly as 'Appradorai'. There is a joint author in this entry, namely, Arora VH, but this name has been given as Arora, V K in the Index. The truth is that the review of the publication which the reader has been looking for appears as item 508 but the Index cannot help him in any way.

There are similar mistakes in the Reviewer Index also. The reviewers of a number entries between item 14 and 25 are given wrong entry numbers in the Index. While a few of them (A P Srivastava, Richard Solomon) are not even mentioned. There are typographical errors in many places. A reviewer is named as Kamal Narayan Kabra in the Index but he is named as Kamal Nayan Kabra at least in two entries.

It is not the intention of the present reviewer to make a list of all errors. The above is just an indication of the nature of errors. All said, it must be accepted that the objective of the Indian Book Review Index is laudable and the present volume will meet this objective to a large extent. If there is any plan to increase the coverage of the Index, the book review sections of the leading newspapers may be considered.

Ballistics; A biblioview; ballistics information and its organization for retrieval, by G.J. Narayana. Pune, Institute of Armament Technologists (India), 1977. x, 254p. Rs. 65.00, $ 8.00.
[Reviewed by B. Guha]

The work is based on the author's dissertation submitted for Master's degree in library science of the Bombay University. It is essentially a biblioview or bibliographical study of the subject of Ballistics. Shri Narayana's long association with the Institute of Armament Technology as the Head of its Technical Information Centre should make him immensely competent to provide such a biblioview.

The view is presented in three distinct parts. An idea of the subject of ballistics is first presented which is followed by a couple of chapters on its information sources, and then is presented a discussion on the information system design for the subject. The first two chapters are on the subject itself. The chapters demonstrate, incidentally, how well an alert information worker may become familiar with the broad contours of a subject in which he has to operate. The next two chapters, which form the second part of the study, survey the organizations engaged in ballistics research and development and highlight the sources of ballistics information. An idea of the immense scatter of the journal literature is provided through an analysis of the coverage of the ballistics literature in the Applied Mechanics Review for the years 1970 to 1975.

The third part, covered by Chapters 5 and 6, is on the organisation of ballistics information for retrieval and dissemination. This part, as the author puts it, is the main theme of the book. Readers also are likely to devote their attention to this part. A greater portion of this part is necessarily devoted to discussions about the various indexing languages including the schemes of classification. Most of the available languages and schemes are, however, considered to be unsuitable by the author. He observes, " Among the index languages suitable for organizing ballistics information a thesaurus approach seems to be better suited than that of a classification approach" As there is a need for designing a special thesaurus for ballistics, the author himself has provided a model, in one of the appendices, taking into account the terms that he has already collected.

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INDEX

Abstract bulletin
  application of CPM 35-36
Abstracting/indexing services
  in agriculture 111-12
Abstracting/indexing services
  selection of 75-78
Aerospace information system
  68-71
Aging factor
  periodicals 102
Agricultural information
  network 110-116

Balasubramanian V see
  Devadason F J
Bibliographic exchange format
  133

Chakraborty A R and
 Chakraborty B:
  Giants in library and
  information science 52-54
Chakraborty B see
  Chakraborty A R
Change of titles of periodicals 28
Citation analysis
  chemical periodicals 55-61
Citation analysis
  plate tectonics 87-89
Computer generation
  of thesaurus 79-85
Computerised catalogue 93-97
Critical path method
  application to library
  science 31-37

Desai H G see
  Narayana G J
Devadason, F J: Automated
  system for generating
  thesaurus from subject
  representations 79-85
Dhirendra Rao M K: PERT/CPM,
  its application to library
  and information systems
  31-37
District libraries
  Himachal Pradesh 122-131
Document supply services
  Insdoc 62-67

Fungal attack on books 106-109

Giants in library science
  52-54
Guha B: Documentation and
  information services,
  techniques and systems
  (review of) 136
Guha B, reviewer
  Ballistics, a biblioview,
  by G J Narayana 141
Guha B, reviewer
  Comparative and international
  library science, by J F
  Harvey 139
Guha B, reviewer
  Fundamentals of library
  science, by J S Sharma 138
Guha B, reviewer
  Indian book review index,
  1975-76, ed by A R Sethi
  and H M K Moodgal (review of)
  140
Gupta D K: Plate tectonics, a
  study of transmission of
  ideas 86-92
Gupta D K: Selection of
  secondary information
  services 75-78
Gupta P K: Library and information science curriculum
  development, a survey 3-21
Gupta R C, Jayaraman N,
  Krishanlal and Ravindran, C C:
  Maintenance of periodicals
  collection, a statistical
  study 101-105

Half life, periodicals 102
Harvey J F: Comparative and
  international library
  science (review of) 139

IINTE Clearing house 133
IRANDOC 72-74
ISDS International Register
  of periodicals 132
Indian Institute of Technology
  Delhi, Library
  use pattern 38-47
Indian scientific periodicals,
  growth of 22-30
Information needs
  of biomedical scientists,
  India 48-51
Iranian Documentation Centre
  72-74

Jayaraman N see
  Gupta R C
Joseph L see
  Narayana G J
Journal acquisition
  cost effectiveness 98-100

Karanjai, Aruna see
  Yadav R S
Krishanlal see
  Gupta R C

Library science curriculum
  3-21

Malhan I V and Thakar G S:
  District libraries in
  Himachal Pradesh, a survey
  122-31
Management techniques
  application to library
  science 31-37
Mohinder Singh: Studies of
  chemical literature and
  changes in the ranking of
  periodicals by citation
  analysis of data for 1967-76: 55-61

Narayana G J: Ballistics,
  a biblioview (review of)
  141
Narayana G J, Desai H G and
  Joseph L: Fungal attack
  on books, a report 106-109
Network analysis
  rules and symbols 32-33

PERT/CPM application
  library and information
  systems 31-37
Periodicals collection
  maintenance 101-105
Plate tectonics, a study
  of transmission of ideas
  86-92
Preservation of books
  from fungal attack 106-109

Raghavan K S: Journal
  acquisition and cost-effectiveness in a special
  library, a case study 98-100

Ranking of periodicals chemistry 55-61
Ravindran C C see Gupta R C
Ray, Harmon and Demetrios G: Distribution parameter systems (review of) 140

Sadhu, Ashok: Designing a computerised catalogue using COBOL 93-97
Saha, Karuna: Use pattern of IIT, Delhi Library, a survey 38-47
Satish N G: Reporting of the Indian social science periodical literature in international abstracting services 117-121
Satyanarayana R, reviewer Documentation and information services, techniques and systems, by B Guha 136
Secondary information services 75-78
Selective Dissemination of Information 133
Sen B K: Growth of Indian scientific periodicals 1788-1965, an outline of a comprehensive bibliography 22-30
Sengupta, I N: Bioresearch planning and information needs for biomedical scientists in India 48-51
Sethi A R and Moodgal H M K: Indian book review index, 1975-76 (review of) 140
Setty Umapathy K: Iranian Documentation Centre 72-74
Sharma J S: Fundamentals of library science (review of) 138
Social science articles, Indian reporting in international abstracting services 117-21
Surendar Mohan: Agricultural information network in India 110-116

Taneja S K: Aerospace information system in India, a proposed plant 68-71
Tehran Book Processing Centre 73-74
Thakar G S see Malhan I V
Thesaurus generation from subject representations 79-85

Unisist programmes 132-135

Yadav R S and Karanjai, Aruna: Meeting the information needs of research scientists, a sample analysis of Insdoc document supply services 62-67

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